

Thorndyke
Prediction of vocational success



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PREDICTION OF
VOCATIONAL SUCCESS

PREDICTION OF VOCATIONAL SUCCESS

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PREFACE AND ACKNOWLEDGMENTS

THE purpose of this report is to tell what we have discovered by following for ten years a large group of children who were carefully studied in 1922. The table of contents shows the general nature of our contribution.

We take this occasion to express our thanks to the many officers of the New York City schools, of various governmental and philanthropic agencies, and of business corporations, who have cooperated with us. From the superintendent of schools to clerks and bookkeepers, we have received favors which we could seldom return. We are also in debt to the young men and women who have tolerated our visits and answered our questions year after year. The investigations reported in this volume were made possible by a grant from the Commonwealth Fund, supplemented by aid from the Carnegie Corporation and from Teachers College.

The author first-named is responsible for planning the investigation and for this report (except as otherwise stated). But its execution has been entirely dependent on the devotion and efficiency of the collaborators. Besides those named as co-authors, we have had important assistance from Dr. H. A. Toops, Miss Vera E. Dye, Miss Marjorie Rankin, and Miss Elizabeth R. Roby in the early years, and from Mr. Edward G. Stephany, Mr. John Tanno, and Miss Julia Cauffman in 1931 and 1932.

E. L. T.

December, 1933

CONTENTS

I. THE PROBLEM	1
II. THE FACTS KNOWN ABOUT EACH CHILD AT THE TIME OF THE TESTS	5
III. THE FACTS FOR EIGHT YEARS OR MORE FOLLOWING THE TESTS	16
IV. THE SIGNIFICANCE OF THE EARLY SCHOOL RECORD AND TEST SCORES FOR PREDICTION AND GUIDANCE	30
V. EDUCATIONAL PREDICTION AND GUIDANCE	44
VI. VOCATIONAL PREDICTION AND GUIDANCE	57
VII. SPECIAL GROUPS	85
VIII. SOME ERRONEOUS IDEAS AND PRACTICES CONCERNING EMPLOYMENT	96
IX. SUMMARY OF RESULTS IMPORTANT FOR THE THEORY AND PRACTICE OF VOCATIONAL GUIDANCE	113
APPENDIX	
I. THE TESTS	121
II. THE SELECTION OF THE CHILDREN TO BE STUDIED, AND THEIR LIFE HISTORIES	130
III. THE TRANSMUTATION OF TEST-SCORES TO ESTIMATED SCORES AT AGE 14.0	137
IV. THE DERIVATION OF SCHOLARSHIP MARKS FOR INDIVIDUALS NOT CONTINUING IN SCHOOL BEYOND GRADE 9, 8B, 8A, 7, OR 6	150
V. DERIVATION OF SCORE FOR SCHOOL PROGRESS FROM THE TIME OF THE TEST TILL THE TIME OF LEAVING SCHOOL OR OF GRADUATION FROM SENIOR HIGH SCHOOL	170
VI. WAYS AND MEANS OF FOLLOWING INDIVIDUALS AND RECOVERING LOST CASES	173
VII. A. THE RELIABILITY OF EMPLOYEES' RECORDS OF EMPLOYMENT. B. THE RELIABILITY OF EMPLOYMENT DATA RE-	

PORTED BY EMPLOYEES FOR THEIR CURRENT JOBS. C. THE INFLUENCE OF THE UNRELIABILITY OF EMPLOYEES' REPORTS UPON THE RESULTS STATED IN CHAPTER VI AND IN APPENDIX XIV	179
VIII. SAMPLES OF RECORD CARDS	195
IX. A. DERIVATION OF ITEMS OF VOCATIONAL HISTORY AT AGES 20.0 TO 22.0 AND 18.0 TO 20.0. B. RECORDS OF THE PERIOD FROM AGE 16.0 TO AGE 18.0	198
X. DETERMINATION OF COMPOSITE MEASURES DERIVED FROM SCHOOL RECORDS AND TEST SCORES AT AGE 14.0 AND THE VALUE OF SUCH MEASURES IN PROPHECYING LATER EDUCATIONAL SUCCESS	209
XI. TABLES SHOWING THE PREDICTIVE VALUE FOR VOCATIONAL SUCCESS OF EACH ITEM OF SCHOOL RECORD AND TEST SCORES	223
XII. CORRECTION FACTORS FOR MAKING EARNINGS COMPARABLE FOR ANY PERIOD FROM JANUARY 1, 1923, TO JUNE 30, 1930	238
XIII. THE UNRELIABILITIES OF THE VARIOUS MEASURES USED IN THE INVESTIGATION; THE RESULTS WHICH WOULD BE OBTAINED IF PERFECTLY RELIABLE MEASURES COULD BE USED	244
XIV. A. TABLES SHOWING FREQUENCY DISTRIBUTION OF SCORES IN SCHOOL RECORDS AND TESTS. B. TABLES SHOWING FREQUENCY DISTRIBUTION OF VOCATIONAL STATUS OF SUBJECTS WITH HISTORIES AT AGE 22.0 COMPLETE TO JULY 1, 1932	254
INDEX	279

ILLUSTRATIONS

MATERIAL FOR I.E.R. GIRLS ASSEMBLY TEST	<i>facing page</i> 126
SAMPLE OF SCHOOL DATA CARD FOR BOYS	196
SAMPLE OF FOLLOW-UP CARD FOR GIRLS	197
SAMPLE OF VOCATIONAL SUMMARY CARD	199
RELATION OF VOCATIONAL STATUS AT AGE 20.0 TO 22.0 TO THAT AT AGE 18.0 TO 20.0	206

TABLES

1. Grade reached at age 14.0 (Item 2a). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)	7
2. School progress up to the time of the tests (Item 10). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)	8
3. Average of conduct marks up to the time of the tests (Item 11). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)	8
4. Average of "works" (scholarship) marks up to the time of the tests (Item 12). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)	9
5. Average attendance scores up to the time of the tests (Item 13). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200). The score is 100 minus the average number of absences per semester	9
6. Scores in arithmetical problems test (Item 7). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)	10
7. Scores in paragraph reading test (Item 8). Percentage distribution (corrected to age 14.0) for Boys Age Group (n=266) and Girls Age Group (n=200)	10
8. Scores in abstract intelligence test (Item 9). Percentage distribution of arithmetic score plus reading score for Boys Age Group (n=266) and Girls Age Group (n=200)	12
9. Scores in clerical intelligence test (Item 3). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)	12
10. Scores on clerical activities test (Item 4). Percentage distribution for Girls Age Group (n=200)	13
11. Scores in mechanical adroitness tests (Item 5 or 6). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)	13

12. Relative superiority of clerical intelligence (Item 3) over mechanical adroitness (Item 14). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$) 15
13. Relative superiority of clerical activities (Item 4) over mechanical adroitness (Item 15). Percentage distribution for Girls Age Group ($n=200$) 15
14. Age at leaving school (Item 16). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$) 18
15. Number of half-years in school (Item 17). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$) 18
16. Grade reached at leaving school (Item 18). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$) 19
17. School progress after the time of the tests (Item 19). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$) 20
18. Average scholarship mark after the time of the tests (Item 20). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$) 20
19. Average earnings per year at age 20.0 to 22.0 (Item 22). Percentage distribution for those in Boys Grade Group at work or seeking work at age 20.0 to 22.0 ($n=664$) 29
20. Relation of grade reached at age 14.0 (Item 2a) to age at leaving school (Item 16). Boys Age Group ($n=266$). $r=.04$ 31
21. Relation of grade reached at age 14.0 (Item 2a) to grade reached at leaving school (Item 18). Boys Age Group ($n=266$). $r=.71$ 32
22. Relation of score in arithmetic and reading at age 14.0 (Item 9) to age at leaving school (Item 16). Boys Age Group ($n=266$). $r=-.055$ 34
23. Relation of score in arithmetic and reading at age 14.0 (Item 9) to grade reached at leaving school (Item 18). Boys Age Group ($n=266$). $r=.54$ 35

24. Relation of score in arithmetic and reading at age 14.0 (Item 9) to the score in clerical intelligence (Item 3). Boys Age Group (n=266). $r = .81$	37
25. Relation of composite score of grade reached at age 14.0 and age at leaving school (Items 2a and 16) to grade reached at leaving school (Item 18). Sampling of Boys Age Group (n=80). $r = .95$	38
26. Relation of score in arithmetic and reading at age 14.0 (Item 9) to earnings per year at age 20.0 to 22.0 (Item 22). Mechanical workers from Girls Grade Group (n=121). $r = .21$	39
27. Relation of score in arithmetic and reading at age 14.0 (Item 9) to earnings per year at age 20.0 to 22.0 (Item 22). Clerical workers from Girls Grade Group (n=199). $r = .23$	40
28. Relation of average school conduct mark up to the time of the tests (Item 11) to earnings per year at age 20.0 to 22.0 (Item 22). Mechanical workers from Girls Grade Group (n=121). $r = .02$	41
29. Relation of average school conduct mark up to the time of the tests (Item 11) to earnings per year at age 20.0 to 22.0 (Item 22). Clerical workers from Girls Grade Group (n=196). $r = .05$	42
30. Relation of earnings per year at age 18.0 to 20.0 (Item 30) to earnings per year at age 20.0 to 22.0 (Item 22). Clerical workers from Girls Grade Group (n=193). $r = .65$	43
31. Correlations of school records and test scores at age 14.0 with measures of later educational success and with one another. Boys Age Group (n=266)	53
32. Correlation of school records and test scores at age 14.0 with measures of later educational success and with one another. Girls Age Group (n=200)	54
33. Correlations of school records and test scores at age 14.0 with measures of later educational success and with one another. Boys Grade Group (n=785)	55
34. Correlations of school records and test scores at age 14.0 with measures of later educational success and with one another. Girls Grade Group (n=905)	56

35. Correlations of school records and test scores at age 14.0 with earnings (Item 22), level of work (Item 23), and interest in work (Item 24) at age 20.0 to 22.0 58
36. The values of various combinations of Items 3, 4, 9, 5, and 2r for predicting earnings at age 20.0 to 22.0; and the data from which the multiple correlations are computed 62
37. Probable earnings per year (in dollars) at age 20.0 to 22.0 at clerical work of a boy or girl making the stated score in grade 8B in the test of clerical intelligence (Item 3) as of age 14.0 63
38. Difference in the predictive value of school records and test scores at age 14.0 for clerical success at age 18.0 to 20.0 and at age 20.0 to 22.0. Weighted average correlations for Boys Grade and Girls Grade Groups 65
39. Difference in the predictive value of school records and test scores at age 14.0 for success at other than clerical work at age 18.0 to 20.0 and at age 20.0 to 22.0. Weighted average correlations for Boys Grade and Girls Grade Groups 66
40. The difference between average school records and test scores at age 14.0 of subjects from all groups engaged at age 20.0 to 22.0 chiefly in clerical work and those of subjects from all groups engaged chiefly in mechanical work 69
41. Correlation of average percentile ranks in mental tests with earning capacity and regularity of employment (Woolley) 77
42. Relation between the degree of accordance with the recommendation made by the counselor and 1) ratings of success by employers, and 2) ratings of liking by employees, for work done from 14.0 to 17.0 (approximately) (Condensed from Earle) 79
43. Relation between the degree of accordance with the recommendation made by the counselor and employers' and employees' ratings of suitability of job to employee (Condensed from Allen and Smith) 82
44. Correlations of number of changes of employer (Item 26) at ages 18.0 to 20.0 and 20.0 to 22.0 with earnings (Items 22 and 30), level of job (Items 23 and 31), and interest in job (Items 24 and 32); and also with various items of

fact known at the time of the tests. Mechanical and clerical workers in the Boys and Girls Grade Groups	83
45. The status at age 14.0 of boys and girls in Grade Groups who attended college, teachers training schools, or evening high schools. Weighted average divergences of the test scores at age 14.0 from the means of the group in question	88
46. The status at age 14.0 of boys and girls who became criminals, notably immoral persons, or loafers. Weighted average divergences of the test scores at age 14.0 from the means of the Boys Age or Girls Age and Boys Grade or Girls Grade Groups	90
47. Number of changes of employer. Distribution and percentage distribution for boys and girls of all groups for whom complete records are available	98, 99, 100
48. Average annual earnings at age 20.0 to 22.0 (Item 22) of those in Age and Grade Groups engaged chiefly in mechanical or clerical work; also mean scores in Items 3, 9, 5 (or 6), 2a (or 2r), and 12	102
49. Average annual earnings at age 18.0 to 20.0 (Item 30) and at age 20.0 to 22.0 (Item 22) of those in Age and Grade Groups engaged chiefly in mechanical or clerical work. The number of workers in each group is given in parentheses after the figure for earnings	105
50. Correlations of the ratings of the father's occupation with various items of vocational history, educational history, and test scores at age 14.0 for those in Boys Grade and Girls Grade Groups engaged chiefly in clerical or mechanical work	107
51. Correlations of height and weight at age 14.0 with annual earnings, level of job, and interest in job at age 20.0 to 22.0 and at age 18.0 to 20.0 (Items 22, 23, 24, 30, 31, 32) for those in Boys Grade and Girls Grade Groups engaged chiefly in mechanical or clerical work	109
52. Correlations of height and weight at age 14.0 with school progress (Item 2a or 2r), clerical intelligence (Item 3), abstract intelligence (Item 9), and mechanical ability (Item	

5 or 6) at age 14.0 for those in Age and Grade Groups engaged chiefly in mechanical or clerical work	110
53. Correlations of height and weight at age 14.0 with annual earnings at age 20.0 to 22.0 (Item 22) and at age 18.0 to 20.0 (Item 30) for those in the Boys Grade and Girls Grade Groups having identical scores in abstract intelligence test (Item 9)	112

APPENDIX

A1. Corresponding ranges for age in total 8B population, New York City, and in Boys and Girls Grade Groups	132
A2. Corresponding ranges for half-year gains in total 8B population, New York City, and in Boys and Girls Grade Groups	132
A3. To estimate the reading score at age 14.0 from the score at any age	138
A4. To estimate the arithmetic score at age 14.0 from the score at any age	139
A5. To estimate the score in the clerical intelligence test (C1) at age 14.0 from the score at any age	140
A6. To estimate the score in the clerical activities test (C2) at age 14.0 from the score at any age	141
A7. Average scores in clerical activities test (C2). Classification by age and grade for selected pupils in normal progress classes, 1921 and 1930.	142
A8. Differences in average scores in clerical activities test (C2), of selected pupils in normal progress grades, 1921 and 1930, classified by age and grade	144
A9. To estimate the score in the mechanical adroitness (Stenquist Assembly) test at age 14.0 from the score at any age	146
A10. To estimate the score in the mechanical adroitness (I. E. R. Assembly) test at age 14.0 from the score at any age	147
A11. To estimate the grade reached at age 14.0 for a pupil in any grade 3A to 8B at any age 12.0 to 16.5	143, 144
A12. Median senior high school marks of pupils having median marks of 63-67, 68-72, etc., in grade 9 of six junior high schools	152

A13. Average senior high school marks of pupils having average marks of 63-67, 68-72, etc., in grade 9 of six junior high schools	153
A14. Divergence of the median senior high school mark from that of pupils in the same school having a median mark of 73-77 in grade 9 of six junior high schools	154
A15. Divergence of the average senior high school mark from that of pupils in the same school having an average mark of 73-77 in grade 9 of six junior high schools	154
A16. Estimated score in Item 20 (average scholarship mark in senior high school) for a pupil attaining any average mark from 50 to 95 in grade 9 of any of six junior high schools and from 96 to 100 in one school	155, 156
A17. Median senior high school marks of pupils having median marks of 58-62, 63-67, etc., in grade 8B of six junior high schools	157
A18. Average senior high school marks of pupils having average marks of 58-62, 63-67, etc., in grade 8B of six junior high schools	158
A19. Divergence of the median senior high school mark from that of pupils in the same school having a median mark of 73-77 in grade 8B of six junior high schools	159
A20. Divergence of the average senior high school mark from that of pupils in the same school having an average mark of 73-77 in grade 8B of six junior high schools	160
A21. Estimated score in Item 20 (average scholarship mark in senior high school) for a pupil attaining any average mark from 40 to 100 in grade 8B of any of six junior high schools	162, 163
A22. Median senior high school marks of pupils having median works marks of 2, 2½, 3, etc., in nine elementary schools	164
A23. Average senior high school marks of pupils having average works marks of 2, 2½, 3, etc., in nine elementary schools	165
A24. Divergence of the median senior high school mark from that of pupils in the same school having a median works mark of 4 in nine elementary schools	166

A25. Divergence of the average senior high school mark from that of pupils in the same school having an average works mark of 4 in nine elementary schools	167
A26. Estimated score in Item 20 (average scholarship mark in senior high school) for a pupil attaining any average works mark from 1 to 6 in any of nine elementary schools	168
A27. Derivation of score in Item 19 (school progress after the time of tests)	171, 172
A28. Number of work histories obtained from employers	182
A29. Average duration of employment in weeks as reported by employers and employees	183
A30. Average weekly salary as reported by employers and employees	186
A31. Average work level as reported by employers and employees	186
A32. Reports of employees and employers classified and compared for frequency of agreement, understatement, and overstatement.	188
A33. Reliability of the reports for their current jobs given by a group of stable employees	192
A34. Correlations between the overstatement of salaries, length of jobs, and level of work (measured in each case by employee's report minus employer's report) and Items 3, 9, 5 and 6 (clerical intelligence, arithmetic plus reading, and mechanical adroitness)	193
A35. Data for estimating the probable earnings per year at age 20.0 to 22.0 from the actual earnings at age 18.0 to 20.0 and vice versa. The actual annual earnings in hundreds of dollars of the 10th percentile, 20th percentile, 30th percentile, etc., at the two periods in the case of boys working at M, boys working at C, girls working at M, and girls working at C	201
A36. Data for estimating the probable level of work at age 20.0 to 22.0 from any given level at age 18.0 to 20.0 and vice versa. The average level at C or at M work in either period in the case of a person who did that sort of work in the other period only	203

A37. Relation of average level of work at age 18.0 to 20.0 (Item 31) to average level at age 20.0 to 22.0 (Item 23) for 344 persons engaged entirely in clerical work at both periods	204
A38. Relation of average level of work at age 18.0 to 20.0 to average level at age 20.0 to 22.0 for 242 persons engaged entirely in mechanical work at both periods	205
A39. Intercorrelations of Items 2a, 3, 5 21. Boys Age Group. n=266	210, 211
A40. Intercorrelations of Items 2a, 3, 6 21. Girls Age Group. n=200	212, 213
A41. Intercorrelations of Items 2, 3, 4, 5 21. Boys Grade Group. n=785	214, 215
A42. Intercorrelations of Items 2, 3, 4, 6 21. Girls Grade Group. n=905	216, 217
A43. Correlations of each item of school record and test scores at age 14.0 with average annual earnings at age 20.0 to 22.0. For group W1, and those in group W2 who did not stop work for marriage till after age 21.0.	224, 225
A44. Correlations of each item of school record and test scores at age 14.0 with average level of job at age 20.0 to 22.0. For group W1, and those in group W2 who did not stop work for marriage till after age 21.0	226, 227
A45. Correlations of each item of school record and test scores at age 14.0 with average interest in job at age 20.0 to 22.0. For group W1, and those in group W2 who did not stop work for marriage till after age 21.0.	228, 229
A46. Correlations of each item of school record and test scores at age 14.0 with earnings, level of job, and interest in job. For those in all groups at all sorts of work at age 20.0 to 22.0	230, 231
A47. Correlations of each item of school record and test scores at age 14.0 with average annual earnings at age 18.0 to 20.0	232, 233
A48. Correlations of each item of school record and test scores at age 14.0 with average level of job at age 18.0 to 20.0	234, 235

- A49. Correlations of each item of school record and test scores at age 14.0 with average interest in job at age 18.0 to 20.0 236, 237
- A50. Gainfully employed persons in Age Group 20.0 to 24.0 in New York City in 1920, classified by broad industry grouping and by sex 239
- A51. Correction factors to make earnings comparable 242, 243
- A52. Scores in Items 2 through 20. Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200) 255-259
- A53. Scores in Items 2 through 20. Percentage distribution for Boys Grade Group (n=785) and Girls Grade Group (n=905) 260-264
- A54. Average earnings per year at age 20.0 to 22.0 classified by type of work. All groups 266, 267
- A55. Level of work at age 20.0 to 22.0 classified by type of work. All groups 268, 269
- A56. Interest in work at age 20.0 to 22.0 classified by type of work. All groups 270, 271
- A57. Average earnings per year at age 18.0 to 20.0 classified by type of work. All groups 272, 273
- A58. Level of work at age 18.0 to 20.0 classified by type of work. All groups 274, 275
- A59. Interest in work at age 18.0 to 20.0 classified by type of work. All groups 276, 277

PREDICTION OF
VOCATIONAL SUCCESS

NOTE

THE boys and girls who were the subjects of the vocational guidance inquiry were grouped into two main classifications according to the basis of their selection by age and grade. They also were grouped according to the way they spent their time at age 18.0 and after, whether at work, at school, or at home. Those that were working after they left school were classified by the type of work they did.

Similarly, the facts with regard to the boys and girls studied which served as measures of ability at age 14.0 and of success later were classified and numbered.

In the course of the study, these various groups and items of fact will often be referred to by initial letters or by number and for the convenience of the reader a complete reference list is given below. The scales by which level of work and interest in work were graded are also given.

CLASSIFICATION OF SUBJECTS

<i>Age and Grade</i>		<i>Type of Work</i>	
B.A.	Boys Age Group	C.	Clerical
B.G.	Boys Grade Group	M.	Mechanical
G.A.	Girls Age Group	CM.	Clerical-mechanical
G.G.	Girls Grade Group	P.	Professional

Allocation of Time to Work, School, or Home

W1. Those going to work at or before age 18.0 and remaining at work or seeking work at age 22.0 or later

W2. Girls going to work at or before age 18.0 and leaving work for marriage before 22.0

W3. Those remaining in school beyond 18.0 but not reaching the second year of college or an equivalent stage in professional school.

S. Those remaining in school to the second year of college or professional school or later, and not going to work before age 18.0

H1. Those remaining at the parents' home from 18.0 to 22.0 except for work or school amounting to less than one year

H2. Those remaining as in H1 but only until marriage

MEASURES OF ABILITY AT THE TIME OF THE TESTS
AND OF SUCCESS LATER

Fourteen Measures of Ability at the Time of the Tests

Item 2. Age at the time of the tests (in grade 8B, third month)

Item 2r. Divergence of Item 2 from the average of the group, with sign reversed (for Grade Groups)

Item 2a. Grade reached at age 14.0 (for Age Groups)

Item 3. Score at age 14.0 in a test of clerical intelligence (C1)

Item 4. Score at age 14.0 in a test of clerical activities (C2)

Item 5. Score at age 14.0 in the Stenquist Assembly Test of mechanical adroitness (for boys)

Item 6. Score at age 14.0 in the Institute of Educational Research Assembly Test of mechanical adroitness (for girls)

Item 7. Score at age 14.0 in a test in arithmetical problems

Item 8. Score at age 14.0 in the Thorndike-McCall Reading Test

Item 9. Score at age 14.0 in Items 7 + 8 (abstract intelligence)

Item 10. Progress in school up to the time of the tests (10 plus the number of half-years gained)

Item 11. Average of conduct marks up to the time of the tests

Item 12. Average of "works marks" (scholarship marks in elementary schools) up to the time of the tests

Item 13. Average attendance scores up to the time of the tests (100 minus the average number of absences per half-year)

Item 14. Relative superiority of clerical intelligence over mechanical adroitness $\frac{100 + \text{Item 3} - \text{Item 5 or 6}}{2}$

Item 15. Relative superiority of clerical activities over mechanical adroitness $\frac{100 + \text{Item 4} - \text{Item 5 or 6}}{2}$

Six Measures of Later Educational Success

Item 16. Age at leaving school

Item 17. Half-years in school after the time of the tests

Item 18. Grade reached at leaving school

Item 19. School progress after the time of the tests until leaving school

Item 20. Average scholarship marks after the time of the tests

Item 21. Educational success, composite of Items 18, 19, and 20, weighted

Eight Measures of Vocational Success at Age 20.0 to 22.0

- Item 22. Average annual earnings
- Item 23. Average level of work
- Item 24. Average interest in work
- Item 25. Percentage of time employed or seeking work
- Item 26. Number of changes of employer
- Item 27. Relative superiority of weekly earnings at clerical work over earnings at mechanical work of the same person (Item 22C + 40 — Item 22M)
- Item 28. Relative superiority of level of clerical jobs over level of mechanical jobs held by the same person (Item 23C + 6.0 — Item 23M)
- Item 29. Relative superiority of interest in clerical jobs over interest in mechanical jobs held by the same person (Item 24C + 6.0 — Item 24M)

Eight Measures of Vocational Success at Age 18.0 to 20.0

- Item 30. Average annual earnings
- Item 31. Average level of work
- Item 32. Average interest in work
- Item 33. Percentage of time employed or seeking work
- Item 34. Number of changes of employer
- Item 35. Relative superiority of weekly earnings at clerical work over earnings at mechanical work of the same person (Item 30C + 40 — Item 30M)
- Item 36. Relative superiority of level of clerical jobs over level of mechanical jobs held by the same person (Item 31C + 6.0 — Item 31M)
- Item 37. Relative superiority of interest in clerical jobs over interest in mechanical jobs held by the same person (Item 32C + 6.0 — Item 32M)

METHOD OF SCORING LEVEL OF WORK
AND INTEREST IN WORK

Level of Work

- | | |
|---|--|
| 7M and 6M. (Not required in study thus far) | 7C and 6C. (Not required in study thus far) |
| 5M. Boss of one or more | 5C. Boss of one or more |
| 4M. Skilled work by self; journeyman | 4C. Secretary; real bookkeeper; responsible clerk (special department) left in charge of store, etc. |
| 3M. Skilled work under a boss | 3C. Stenographer; ledger clerk; salesman, general department store |
| 2M. Semi-skilled: elevator operator; machine operator; driver of delivery wagon (horse) | 2C. Typist; general clerk; file clerk |
| 1M. Unskilled, with minimum of responsibility | 1C. Unskilled with minimum of responsibility: messenger or errand boy; store cleaning, etc. |

Interest in Work

7. Would rather do present work than any other job he knows of
6. Surely likes (but less liking than 7)
5. Half-way between 6 and 4
4. Indifference (no definite feeling for or against)
3. Half-way between 4 and 2
2. Surely dislikes (but less dislike than 1)
1. Dislikes greatly (would be in despair if he thought he must continue it long)

THE PROBLEM

IT is obviously important to discover how trustworthy and useful educational and vocational guidance is at various ages. It is still more important to discover how trustworthy and useful it can be made, if the best methods now available are used. If, for example, such guidance as is now given at age fourteen were shown to be less trustworthy than an individual's own ideas and impulses, there would be a saving of much time and money by delaying it. If the guidance now given is beneficial, but can be made twice as beneficial by methods which are no more costly, there will be a great gain in efficiency by changing to better methods.

We were commissioned by the Commonwealth Fund in 1921 to investigate the possibilities of guidance at about age fourteen on the basis of items in the child's school record and psychological tests. The former were limited to those available in nearly all school systems. The tests were limited to such as could be safely and conveniently administered by a school principal, Y.M.C.A. secretary, employment manager, settlement worker, or any reliable individual of like standing. After much careful experimentation such tests were developed. The essential facts about them appear in Appendix I and in a previous publication.¹

The school records were obtained from over two thousand children, each of whom was tested with three tests, of so-called general intelligence, clerical capacity, and mechanical adroitness, between December, 1921, and November, 1922. From then till now we have followed as many of these children as we could, recording the educational and vocational life history of each. We have in these life

¹ Herbert A. Toops and others, *Tests for Vocational Guidance of Children Thirteen to Sixteen* (New York: Teachers College, Columbia University, 1923).

histories the means of answering the questions: How long did he continue his education? How much progress did he make? How well did he do so far as he went? When he became a productive worker, what did he do? How well did he like each job? How much was he paid in wages? How much chance had he to obtain useful training and promotion?

Consequently, we can, in ways to be described in later chapters, make determinations of the significance which each fact of school record or test scores at age 14 has for the educational and vocational life of an individual during the eight years following and for his educational and vocational status at the end of the period. It will be possible also to follow these young men and women on through life, and determine how far the promise of childhood and youth tallies with the facts of adult life.

Our inquiry will thus be a means toward deciding whether vocational guidance should be given and, if so, what it should be. The case for educational and vocational guidance at any age will rest on the significance that attaches to items knowable at that age. And the nature of the guidance for any individual will rest on the facts known concerning that individual. There are, of course, many items of physique, abilities, interests, and the like which may be significant and which are not in our school and test record. But ours are fair samples. If they fail, there is no reasonable expectation that others available at age 14 will succeed. If they succeed, we may expect that more exact school records and examinations by trained psychologists will succeed still better. If they justify us in advising certain girls of fifteen to learn a trade rather than continue in a high school, more extended and detailed records and tests will probably help us to decide between certain groups of trades and others, or between certain high school courses and others. The facts for these two thousand boys and girls may settle the general issue.

Most psychologists and all those engaged in educational and vocational guidance will probably declare that the issue is settled already. And perhaps a rehearsal of what is now known, including especially

the results now being obtained by Myers, Burt, and others in England, would demonstrate this. But there are hard-headed leaders in business, philanthropic work, and education who do not regard it as settled. Moreover, no matter how valid a scientific inference seems to be, it is always prudent to submit it to verification by its actual predictive power.

Whatever be true of the general issue, the details of the significance of our items will be welcome to all workers in this field. Just what a bad conduct mark or a low score in mechanical adroitness as measured by the Stenquist Assembly Test means for a person's future career, nobody knows, and all may profit by knowing.

Besides general and detailed facts concerning educational and vocational guidance, our investigation has byproducts which will interest many among those who study human beings, manage them, or try to improve them. Of what sort are those who die between the ages of 14 and 22? Does death take its toll alike from the bright and the dull? Of what sort are those who marry early? How often do girls continue work after marriage? Who go to college, the intellectual or the well-to-do? What was the attitude of these boys and girls to the continuation school which many of them were obliged by law to attend? How often does a young worker change his employer? How often does the character of his work change?

In regard to these and other questions our records have certain disadvantages, but one notable advantage. We are always dealing with a definite and fair example, chosen with absolute impartiality in respect to any such questions. The inquirer who works back from a psychological or social fact to its cause, as in studying the early lives of criminals, or dependents, or men of great scientific achievement, has the advantage of richness of material, but the disadvantage that he may be tempted to find what he is looking for or color what he finds by what he already knows. The method of taking a defined sample of the general population and impartially recording what happens to it is relatively free from such fallacies of selection or emphasis. It consequently provides a useful check.

We hope, indeed, that the method of continuous study of a group of individuals over a long period of time will be shown, by our use of it, to merit application to many other problems than those of vocational guidance.

II

THE FACTS KNOWN ABOUT EACH CHILD AT THE TIME OF THE TESTS

THE 2,225 children tested in 1921-1922 consist of four groups. The first includes all the boys, 271 in number, from 13.0 years to 15.0 years at the time of the tests in one public school in New York City whose pupils were from families of low economic status, whose parents mostly were foreign born, with a high percentage of South Europeans. The second includes all the girls, 203 in number, from 13.0 years to 15.0 years from the two schools serving the same neighborhood. Some eleven- and twelve-year-olds are also included. The third includes the boys, 826 in number, in a fairly representative sampling of eighth-grade classes (8B) from seven schools throughout Manhattan. The fourth includes the girls, 925 in number, in a comparable representative sampling of eighth-grade classes (8B) from five schools.¹ In the first two groups the selection was for age regardless of the grade the individual was in. In the second two it was for grade, regardless of the individual's age. So we may call these groups the Boys Age, Girls Age, Boys Grade, and Girls Grade Groups. The subjects of the tables in this chapter and in Chapter III do not include all the children tested in 1921-22, but only those who were followed till they left school (2,156). Details concerning the selection of subjects are reported in Appendix II.

The first two groups are specially useful for general theory because they form almost a complete sampling from the point of view of intellectual ability, running down to children so dull as to be still in grade 3 at the age of thirteen or fourteen. They lack only

¹ In New York City, 8B is the second or higher half of the eighth grade.

the very bright who pass beyond grade 8 before they are thirteen. The last two groups do not include any extremely dull children, since such are not able to reach grade 8B. But these Grade Groups are specially useful for problems of practical application, since they represent a group alike in school opportunities at the time of tests, and at a stage at which guidance is often required and given.

Except for rare mishaps, we have for each individual child an official school record up to the time of the tests, including age, promotions, marks for conduct, marks for achievement in studies, and absences. This record we condense into five numbers (Items 2, 10, 11, 12, and 13 of our main record)² as follows:

Item 2, age at the time of the tests. Expressed as tenths of a year minus 100, 32 meaning 13.2 years, 48 meaning 14.8 years, etc.³ In our work, we replace Item 2 by 2a or 2r according as the individual was in one of the Age Groups or in one of the Grade Groups. In the Age Groups we use 2a, which represents the grade he would probably be in at age 14.0 as estimated from his age at the time of the tests and the grade he was actually in at that time. The method of making the estimate is described in Appendix III. In 2a, 6=3B, 7=4A, 8=4B, 9=5A, etc. Item 2r, sometimes called "2 reversed," is the divergence of Item 2 for any child from the average of the group, with sign reversed. 2r is then a measure of the youthfulness of reaching the third month of grade 8B.

Item 10, rate of progress in school. Expressed as 10 plus the number of half-years gained, 2 meaning that the child had failed of semi-annual promotion 8 times, 3 that he had failed 7 times, 10 that he had neither gained nor lost a semi-annual promotion or had gained as many as he lost, 11 that he had gained one more than he had lost, and so on.

Item 11, conduct. Expressed as the average of all his conduct or deportment marks, counting that A=60, B+=50, B=30, C+=20, C=10, and D=0.

² The full list of items studied, with description of each, will be found on pages xxii ff.

³ Adjusted to January 1, 1922, for the Boys Age Group, to April 1, 1922, for the Girls Age Group, and to November 1, 1922, for the Boys Grade Group and the Girls Grade Group. The actual dates of testing were close to these.

TABLE 1

Grade reached at age 14.0 (Item 2a). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

GRADE	SCORE ASSIGNED	FREQUENCY		GRADE	SCORE ASSIGNED	FREQUENCY	
		Boys	Girls			Boys	Girls
3A	5	0.4		6B	12	11.7	12.5
3B	6	1.5		7A	13	14.7	13.0
4A	7	2.3	1.5	7B	14	6.4	13.5
4B	8	4.1	2.0	8A	15	12.4	18.0
5A	9	7.1	5.0	8B	16	8.6	13.5
5B	10	11.3	4.0	9A	17	2.3	6.5
6A	11	16.2	7.0	9B	18	1.1	3.5

Item 12, work, or scholarship, or school achievement. Expressed as the average of all his "works marks," by the same system of credits.⁴

Item 13, attendance. Expressed as 100 minus the average number of absences per half-year.⁵

These measures are not the best that could be obtained. The rate of progress measured, when used in the Age Groups, gives the brighter fourteen-year-olds a little advantage over the brighter thirteen-year-olds, and the duller thirteen-year-olds a little advantage over the duller fourteen-year-olds. Allowances could be made to equalize these for different ages.

These measures do differentiate individuals. In the two Age Groups, for example, the variation in grade at age 14.0, rate of progress, conduct, work, and attendance is as shown in Tables 1 to 5.

For each child in the two Grade Groups and in the Girls Age Group we have also a score in the tests of arithmetic (Item 7), reading (Item 8), clerical intelligence (C1, Item 3), clerical activities (C2, Item 4), and mechanical adroitness (Stenquist Assembly

⁴ The term "works marks" as used throughout the study refers to the numerical equivalent ascribed to the letter marks which are given for scholarship in the elementary schools.

⁵ However, for convenience in Hollerith computing, the very few cases in which the result was nearer 100 than 99 were treated as 99.

TABLE 2

School progress up to the time of the tests (Item 10). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$)

FAILURES OF				FAILURES OF			
SCORE	PROMOTION	FREQUENCY		SCORE	PROMOTION	FREQUENCY	
		<i>Boys</i>	<i>Girls</i>			<i>Boys</i>	<i>Girls</i>
0	10	1.1	0.5	8	2	10.9	11.5
1	9	2.6	0.0	9	1	10.9	16.5
2	8	1.1	2.0	10	0	9.8	27.0
3	7	5.3	2.0				
					DOUBLE		
					PROMOTIONS		
4	6	11.3	2.5	11	1	4.9	4.5
5	5	13.2	3.5	12	2	0.4	7.0
6	4	16.5	11.0	13	3		2.0
7	3	12.0	9.5	14	4		0.5

TABLE 3

Average of conduct marks up to the time of the tests (Item 11). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
12	.4		40	16.2	3.0
16	.4		44	20.7	9.0
20	2.6		48	14.7	11.5
24	2.6	1.0	52	11.7	29.5
28	5.3	1.0	56	7.9	21.0
32	4.9	1.0	60	4.9	18.5
36	7.9	4.5			

Test for the boys, Item 5, and I.E.R. Assembly Test for the girls, Item 6). In the case of the Boys Age Group, C2 was not given because it had not yet been prepared and itself tested. Otherwise the program was the same for them. These tests are presented or described in Appendix I, and the reasons for their choice have been

TABLE 4

Average of "works" (scholarship) marks up to the time of the tests (Item 12). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
8	1.1	1.0	36	12.4	20.5
12	0.8	0.5	40	14.3	18.0
16	2.3	1.5	44	9.0	15.0
20	7.1	4.0	48	3.8	7.5
24	11.7	5.0	52	2.3	3.0
28	15.0	11.0	56	0.4	3.0
32	19.9	10.0			

TABLE 5

Average attendance scores up to the time of the tests (Item 13). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200). The score is 100 minus the average number of absences per semester

SCORE	FREQUENCY		SCORE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
58	0.4		78	1.1	1.5
60			80	1.5	1.5
62			82	3.8	4.0
64			84	4.9	4.0
66			86	4.5	6.0
68	0.4		88	8.6	5.5
70	0.4		90	9.0	13.0
72	0.8	1.5	92	15.0	16.0
74	0.8	0.5	94	17.7	20.0
76	1.9	1.0	96	17.7	19.0
			98	11.7	6.5

TABLE 6

Scores in arithmetical problems test (Item 7). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	Boys	Girls		Boys	Girls
0	4.5	5.5	24	12.8	12.0
4	6.0	5.0	28	12.4	15.5
8	7.5	9.0	32	11.3	8.5
12	9.8	9.5	36	5.6	11.0
16	12.8	6.5	40	0.8	1.0
20	16.2	16.5	44	0.0	
			48	0.4	

TABLE 7

Scores in paragraph reading test (Item 8). Percentage distribution (corrected to age 14.0) for Boys Age Group (n=266) and Girls Age Group (n=200)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	Boys	Girls		Boys	Girls
20	1.5		48	10.9	8.5
24	1.5	0.5	52	10.5	15.0
28	6.4	5.5	56	6.4	13.5
32	11.7	7.5	60	5.6	5.5
36	13.9	12.0	64	1.1	4.0
40	17.3	14.5	68	1.1	0.0
44	10.9	13.0	72	1.1	0.5

stated elsewhere.⁶ We need note here only that, in the case of pupils who have had the opportunity to attend school till age 13 or grade 8B, a combined score for solving arithmetical problems and answering questions about paragraphs read silently gives nearly or quite as good an index of general intelligence as any of the tests then or now

⁶ Herbert A. Toops and others, *Tests for Vocational Guidance of Children Thirteen to Sixteen* (New York: Teachers College, Columbia University, 1923).

available for that purpose, and does not require to be administered by a psychologist or specially trained examiner.

From the records in these tests we derive for each child six numbers (five in the Boys Age Group), each of which measured his achievement, *as of age 14.0*, in the test in question. The score actually obtained by him at age 13.1, or 14.9, or whatever his age was on the day he was tested, is adjusted to what it would be at age 14.0, by procedures described in Appendix III. They are simple and sound, and the results are very nearly as good for any matter of guidance as the results of tests actually given at age 14.0 would be.

The numbers below, all representing scores at age 14.0, are for:

Item 7, arithmetic (solving problems)

Item 8, reading (comprehension of paragraphs)

Item 9, abstract intelligence (arithmetic score plus reading score)

Item 3, clerical intelligence (C1)

Item 4, clerical activities (C2)

Item 5 or 6, mechanical adroitness (for boys, the Stenquist Test in assembling a cupboard catch, a clothes pin, a paper clip, a chain, etc.; for girls, the I.E.R. Test in assembling beads on a string, inserting tape, making a rosette, etc.)

These tests are all successful in differentiating individuals. The facts for the Age Groups are shown in Tables 6 to 11.⁷

⁷ Part of the very wide variation shown in each of these tables is due to the accidental variations which make a person's score on one day differ from his scores on other days, and make his score on one form of a test differ from his score on alternative forms of that same sort of test. If we had, for each individual, the average of a score of reading tests on different days and with different paragraphs, the variation shown in Tables 6 to 11 would be somewhat reduced, but would still be large enough to justify our statement. Such fuller information for each individual would possess in a heightened degree whatever significance the actual single test scores are found to have. This whole matter of the influence which more extended and exact measurements of ability in arithmetic, reading, clerical intelligence, etc., would have upon our results will be discussed later. For the present we are concerned only with the tests as they were given, and as any vocational counselor would give them who used the results of such single tests in guidance.

TABLE 8

Scores in abstract intelligence test (Item 9). Percentage distribution of arithmetic score plus reading score for Boys Age Group (n=266) and Girls Age Group (n=200)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
20	0.8		70	9.4	10.0
25	1.1	2.0	75	6.0	9.5
30	3.0	2.0	80	8.3	7.0
35	3.4	2.5	85	6.7	10.0
40	4.5	4.0	90	3.4	10.0
45	6.7	6.5	95	3.4	2.5
50	8.3	9.0	100	2.3	3.5
55	10.2	8.0	105	1.1	0.5
60	11.7	4.5	110	0.4	
65	9.4	8.5			

TABLE 9

Scores in clerical intelligence test (Item 3). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
0	3.8	1.5	36	7.5	10.0
4	3.8	2.5	40	8.3	9.5
8	9.0	3.5	44	6.7	10.0
12	7.5	3.5	48	3.0	4.0
16	10.9	7.5	52	1.5	6.0
20	10.9	6.5	56	2.3	4.5
24	8.3	7.5	60	1.1	3.0
28	6.7	12.0	64	0.0	1.5
32	8.3	6.5	68	0.4	0.5

TABLE 10

Scores on clerical activities test (Item 4). Percentage distribution for Girls Age Group (n=200)

SCORE	FREQUENCY	SCORE	FREQUENCY	SCORE	FREQUENCY
2	0.5	16	7.0	30	7.5
4		18	9.0	32	4.5
6		20	12.5	34	2.0
8	1.0	22	11.0	36	1.0
10	4.0	24	9.5	38	
12	5.0	26	7.5	40	0.5
14	10.0	28	7.5		

TABLE 11

Scores in mechanical adroitness tests (Item 5 or 6). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	Boys	Girls		Boys	Girls
0	1.9	0.5	48	10.9	22.5
8	6.0	1.0	56	9.4	13.5
16	12.8	5.5	64	6.7	8.0
24	11.3	9.5	72	4.1	4.0
32	12.4	17.5	80	3.4	1.0
40	20.7	17.0	88	0.4	

We also compute for each boy or girl two derived measures of the degree to which he is relatively better in the clerical tests than in the tests of mechanical adroitness. A boy may be below average in the clerical test but be so much farther below average in the Stenquist Assembly Test that his C-minus-M score is high. He may be above average in both abilities but so little above average in the clerical test that his C-minus-M score is low. The first derived measure (Item 14) is the clerical intelligence score minus the mechanical adroitness score, but put in the form

$$\frac{100 + \text{Item 3} - \text{Item 5 or 6}}{2}$$

to avoid negative numbers and to use only two Hollerith columns. The second derived measure (Item 15) is the clerical abilities score minus the mechanical adroitness score, also put in the form

$$\frac{100 + \text{Item 4} - \text{Item 5 or 6}}{2}.$$

These C-minus-M scores also show wide differences among individuals. In the Age Groups, for example, they are as shown in Tables 12 and 13.

Such scores representing which one of several things a person can do best rather than how he compares with other persons in doing some one thing are of obvious importance in educational and vocational guidance. If the two measures described here prove to have significance we shall later consider the same differences and others using a more refined and adequate treatment.⁸

We have then fourteen measures summarizing important features of life in school and ability in tests in which children at or near age 14 or in grade 8B differ widely. When we have secured facts concerning the later lives of these same children in school and at work, we shall ask concerning each of the fourteen items: What did the early status in this particular signify concerning the eight years following? What could be predicted from it? Could it have been used helpfully in guidance?

⁸ Readers versed in the theory of measurement will understand that there is a much more accurate way of making these C-minus-M comparisons. We deliberately use this crude subtraction of score from score because it can be used by anyone without making computations or consulting special tables, and because we are not now concerned with perfection of treatment. If the results by simple methods justify the use of more refined methods, we will later express all measures as deviations from the central tendency of the group in units of the variability of the group in the ability in question before subtracting and make also any necessary allowances for skewness. In fact, however, these refinements turn out to be unnecessary.

TABLE 12

Relative superiority of clerical intelligence (Item 3) over mechanical adroitness (Item 14). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

SCORE	FREQUENCY		SCORE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
12	0.8		48	9.4	14.0
16	1.1		52	8.6	10.5
20	3.0		56	8.3	6.0
24	2.6	1.0	60	9.0	2.0
28	7.1	2.5	64	2.6	1.0
32	9.0	10.0	68	1.1	
36	13.9	13.5	72		
40	12.4	20.0	76	0.4	
44	10.5	19.5			

TABLE 13

Relative superiority of clerical activities (Item 4) over mechanical adroitness (Item 15). Percentage distribution for Girls Age Group (n=200)

SCORE	FREQUENCY	SCORE	FREQUENCY
28	1.5	52	18.0
32	1.5	56	12.0
36	5.5	60	9.0
40	12.5	64	1.0
44	22.0	68	0.5
48	16.5		

III

THE FACTS FOR EIGHT YEARS OR MORE FOLLOWING THE TESTS

FAMILIES in New York City change their homes and their schools often. Their immediate neighbors may be unacquainted with them and know nothing of what has happened to them. They frequently change their names, both given names and surnames! Consequently the task of maintaining contact with a boy or girl for eight years is hard, enormously harder than it would be in cities of moderate size. After he leaves school the difficulty increases, and some of our records are, and probably always will be, incomplete.

EDUCATIONAL LIFE HISTORIES

A complete educational history consists of the school attended each half-year, the subjects studied, the marks obtained in each (or the conduct and work marks, if such are given), the fact of promotion or non-promotion, and the date of leaving school permanently. From such a history we compute six measures as follows:

Item 16, age at leaving school permanently.

Item 17, half-years in school. If all pupils entered school at the same age and remained in school continuously except for normal vacations, the number of half-years in school would correspond to the age at leaving school permanently, and be simply a coarser measure of the same fact. The two measures do in fact correspond rather closely, and either alone is a suitable measure of length of schooling. But it seemed best to record both.

Item 18, grade reached at the time of leaving school.

Item 19, rate of progress in school from the time of the tests to the time of leaving school. A number representing the number of promotions

attained per year of attendance with allowances for greater difficulty of attaining promotion in late high school and college than in lower grades. The derivation of this measure is explained in Appendix V.

Item 20, scholarship following the tests. In case the individual did not continue to high school, the scholarship mark is estimated from his scholarship marks in whatever grades he did attend after the time of the tests. In case he left school so soon after the time of the tests that he had no scholarship marks thereafter, an estimate is made from the marks last recorded for him. The means taken to make the scholarship marks of all individuals in any of the four groups comparable are described in Appendix IV. They are necessarily elaborate.

Item 21, educational success. A weighted composite of the grade reached (Item 18), rate of progress in school following the test (Item 19), and scholarship in high school (Item 20), so computed as to give weights to them respectively in the proportions 23, 40, and 37.¹ We lay no stress upon this particular system of weights. Nobody knows just how we should weight the grade a person reaches, failure of promotion, double promotions, being in the top tenth in marks for scholarship, being in the bottom tenth, and the like. Any of several systems would be equally or nearly equally defensible. We use this combined measure of educational success only as a reasonable rough summation of the facts.

It should be noted that each and all of these measures of educational achievement would be more instructive if we could subject them to allowances for conditions of ill health, work at home or outside, education in music or the like outside of school, religious and philanthropic duties fulfilled, and the like. Of two children progressing to the same grade at the same rate, and attaining the same marks in scholarship, one may do so in a less favorable environment or while also making other notable achievements. We cannot make such allowances because we lack the necessary intimate knowledge.

The two measures of length of schooling (Items 16 and 17)

¹ These are averages. The weights vary from these somewhat in the four groups, being 21, 44, and 35 in the Boys Age Group; 22, 46, and 32 in the Girls Age Group; 24, 38, and 38 in the Boys Grade Group; 24, 30, and 36 in the Girls Grade Group.

TABLE 14

Age at leaving school (Item 16). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

AGE	FREQUENCY		AGE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
12.8		0.5	16.8	4.5	4.5
13.2	0.4	1.5	17.2	2.3	4.0
13.6	1.1	0.5	17.6	0.4	4.0
14.0	3.8	2.5	18.0	1.1	0.5
14.4	7.9	7.0	18.4	2.3	0.5
14.8	19.9	16.0	18.8	0.4	0.5
15.2	16.5	17.5	19.2		
15.6	13.5	12.0	19.6	0.4	1.0
16.0	15.8	18.0	20.0		
16.4	8.3	9.5	20.4	1.1	

TABLE 15

Number of half-years in school (Item 17). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

HALF-YEARS IN SCHOOL	FREQUENCY		HALF-YEARS IN SCHOOL	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
9		1.0	20	10.1	13.0
10		0.5	21	10.1	4.5
11	0.4	0.5	22	3.4	6.5
12		1.0	23	1.5	1.0
13		1.0	24	2.3	2.0
14	0.4	4.0	25	1.1	1.0
15	3.4	5.0	26	0.4	0.5
16	14.7	14.5	27	0.4	
17	12.8	12.5	28	0.4	0.5
18	22.2	20.0	29	0.4	
19	15.8	11.0	30 or >	0.4	

TABLE 16

Grade reached at leaving school (Item 18). Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200)

GRADE	SCORE ASSIGNED	FREQUENCY		GRADE	SCORE ASSIGNED	FREQUENCY	
		<i>Boys</i>	<i>Girls</i>			<i>Boys</i>	<i>Girls</i>
4B	8		0.5	12A	23		1.5
5A	9	1.5	1.0	12B	24	0.8	
5B	10	3.8	2.5				
6A	11	4.5	1.0	COLLEGE			
6B	12	7.1	3.5	1 yr.	25	2.6	2.0
7A	13	19.9	8.0	1 yr.	26		
7B	14	11.3	3.5	2 yr.	27		
8A	15	3.8	3.0	2 yr.	28		0.5
8B	16	4.1	4.5	3 yr.	29	0.4	
9A	17	21.4	21.0	3 yr.	30		
9B	18	6.4	9.5	4 yr.	31		
10A	19	7.1	25.0	4 yr.	32	0.4	
10B	20	2.6	4.5				
11A	21	1.9	5.5	GRADUATE WORK			
11B	22		3.0	1 yr.	33	0.4	

differentiate the individuals well. Tables 14 and 15 show the facts for the Age Groups. Some boys and girls leave school at once; others are still in school nine years later. The total number of half-years in school ranged from 9 to over 30. The grade reached (Item 18) also shows a range from those who drop out before the fifth grade to those who graduate from college and enter a graduate or professional school. Table 16 shows the facts for the Age Groups.

The rate of progress and the scholarship marks (Items 19 and 20) are less satisfactory measures. If a pupil stays in school for only one or two half-years, we have too short a career to permit the number of promotions to be a reliable index. The case is not very much better with the high school marks in such cases. A teacher having from 150 to 200 pupils, and for one semester only, must either possess extraordinary devotion and sagacity in preparing and cor-

TABLE 17

School progress after the time of the tests (Item 19). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$)

RATE	FREQUENCY		RATE	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
2-3	3.4	1.0	12-13	7.5	7.0
4-5	17.6	6.0	14-15	0.8	2.5
6-7	19.5	5.0	16-17	1.1	2.5
8-9	16.1	13.5	18-19		0.5
10-11	34.2	62.0			

TABLE 18

Average scholarship mark after the time of the tests (Item 20). Percentage distribution for Boys Age Group ($n=266$) and Girls Age Group ($n=200$)

MARK	FREQUENCY		MARK	FREQUENCY	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
30	0.4		62	38.0	36.5
34			66	10.9	36.0
38	0.4		70	4.5	12.5
42	0.8	0.5	74	1.9	4.0
46			78	0.4	
50	11.7	2.5	82		
54	11.3	1.5	86		0.5
58	19.9	6.0			

recting tests or must use objective standardized examinations, if his marks are to represent the variety of achievement at all accurately. This will rarely occur for the majority of a pupil's teachers. Consequently, the average or median marks are crowded between 60 and 75 for the most part, and a difference of 3 or 4 points (say between 64 and 68), due to one or two half-years only, is not highly reliable. The facts for the Age Groups are shown in Tables 17 and 18.

VOCATIONAL LIFE HISTORIES

When a boy or girl left school, a visit to the home was made as soon as possible and communication was maintained thereafter to the best of our ability by further visits, telephone calls, and correspondence. It was our rule not to seek interviews at the place of employment and not to interview any employer (except in the case of a few large concerns where our relations with the employment managers made it absolutely certain that our visits would not injure the employee).

Despite our efforts some cases disappeared utterly between the time they left school and the time that we learned of the fact and visited the alleged address. Some other cases disappeared in the intervals between visits. An account of the means used to recover such cases is given by Dr. Lorge in Appendix VI.

Especial effort was made to have the interviews be friendly visits, and still to secure clear notions of these facts for each job since the last interview: 1) the kind of work done, 2) how much was received for it, 3) how well it was enjoyed, 4) the name and address of the employer, and 5) the length of time of each period of unemployment fixed by the dates of beginning and leaving. If the individual exercised supervision over others, the number under supervision was always recorded. During the interview or immediately after it, the interviewer recorded 1, 2, 3, 4, and 5 by suitable notes, and also recorded the general nature of the work as C or M, according as it was predominantly clerical or mechanical. He also estimated the level of the work on the scale from 1 to 7 shown below.

WORK CLASSIFICATION BY LEVEL

7M and 6M. (Not required in study thus far)	7C and 6C. (Not required in study thus far)
5M. Boss of one or more	5C. Boss of one or more
4M. Skilled work by self; journeyman	4C. Secretary; real bookkeeper; responsible clerk (special department) left in charge, etc.

- | | |
|---|--|
| 3M. Skilled work under a boss | 3C. Stenographer; ledger clerk; salesman, general department store |
| 2M. Semi-skilled: elevator operator; machine operator; driver of delivery wagon (horse) | 2C. Typist; general clerk; file clerk |
| 1M. Unskilled, with minimum of responsibility | 1C. Unskilled, with minimum of responsibility: messenger or errand boy; store cleaning, etc. |

The individual's enjoyment of the work was estimated on the interest scale shown below.

INTEREST CLASSIFICATION

7. Would rather do present work than any other job he knows of
6. Surely likes (but less liking than 7)
5. Half-way between 6 and 4
4. Indifference (no definite feeling for or against)
3. Half-way between 4 and 2
2. Surely dislikes (but less dislike than 1)
1. Dislikes greatly (would be in despair if he thought he must continue it long)

The facts of death, serious illness, marriage, removal from the vicinity of New York, and any other matters of importance for the inquiry were noted on the record cards (see page 197) or in the interviewer's log-book. An effort was made to continue the girls' records after marriage.

Special pains were taken to have each interviewer maintain constant standards in all ratings and to have the different interviewers maintain similarity in standards. Mrs. Metcalfe and Miss Robinson (Mrs. Nelson) have served from the very outset. Dr. Lorge has served since September, 1927. All the others who shared in the interviewing were scientific students of vocational psychology, who realized the importance of accuracy and uniformity in the ratings.

Until the ninth year of the inquiry, we took the testimony from the individuals without any check from the employer. During that year, we instituted such a check in the case of an adequate sample. The results of this appear in Appendix VII. They justify our use of the testimony of the individuals. Its occasional errors of pride, concealment, and carelessness do little harm to the purposes of our inquiry.

We have then for each individual with whom we maintained contact a record either through college or at home or in employment. A sample of an employment record is reproduced in Appendix VIII.

On the basis of these records we subdivided our four primary groups (Boys Age, Girls Age, Boys Grade, and Girls Grade) into six classes as follows:

W1. Those going to work at or before age 18.0 and remaining at work or seeking work to age 22.0 or later

W2. Girls going to work at or before age 18.0 and leaving work for marriage before 22.0

W3. Those remaining in school beyond 18.0 but not reaching the second year of college or an equivalent stage in a professional school

S. Those remaining in school to the second year of college or professional school or later, and not going to work before age 18.0 ²

H1. Those remaining at the parents' home from 18.0 to 22.0 except for work or school amounting to less than one year

H2. Those remaining as in H1 but only until marriage

Except for a few exceptional cases, this classification allocates every individual at ages 18.0 to 22.0 as, a) primarily at work if a boy, b) primarily at work or married if a girl, c) primarily at college or professional school, and d) primarily at home.

Consider first the W1 group, those who were at work or seeking

² The second part of this classification is, of course, practically a dead letter. A boy or girl who reached sophomore year before 18.0 would very rarely drop out of college soon enough thereafter to begin work before 18.0.

work from age 18.0 on. We examine the vocational history of each from 18.0 to 20.0 and from 20.0 to 22.0. We record the work of each job as C, M, CM, or P for predominantly clerical, predominantly mechanical, a mixture of clerical and mechanical, and professional.³ We compute for the period 18.0 to 20.0 the average yearly earnings (Item 30), a weighted average level score representing the quality of the work as to dignity, responsibility, educative value, and general desirability (Item 31), and a weighted average interest score representing the satisfyingness of the work to the individual (Item 32). The weights for each job are in proportion to the weeks spent on that job. We also compute the percentage of time out of work (Item 33) and the number of changes of employer (Item 34). If the individual works at both C and M jobs during the two years, we also compute weekly earnings, weighted level scores, and weighted interest scores separately for clerical and mechanical work. The times of unemployment are divided reasonably, as explained in Appendix IX.

Where we have knowledge of the facts for both clerical and mechanical work by the same individual, we proceed to compute the differences between the two in financial return, level, and interest (Items 35, 36, 37).

Exactly the same sort of computations are carried out for the

³ The terms mechanical, clerical, and professional are neither accurate nor adequate to describe the work done by these young people, but they seem to be the best available. As used by us, mechanical includes factory work, the trades, unskilled manual labor, driving a car, dancing, prize-fighting, and any work that involves chiefly bodily strength or skill. Clerical work includes stenography, typewriting, filing, bookkeeping, and all forms of office work, and also selling. A delivery man who not only drove a truck but filled orders, kept records, and did some office work, or a shipping clerk who not only did the clerical work of the job, but also wrapped and packed materials, or a telephone operator, would be classed as a "mixed" or CM worker. It would probably have been better to have isolated selling, but we did not wish to increase our groups for correlation beyond four, and the work of selling in small establishments was often combined with clerical work proper. Moreover, we were concerned with boys and girls choosing careers, and the contrast represented by industry versus business seemed as important as the contrast between manual labor and office work.

period 20.0 to 22.0, giving Items 22, 23, 24, 25, 26, 27, 28, and 29. For a person at work or seeking work from 18.0 to 22.0 we have then a record of the kind of work and a set of numbers representing Items 22 to 26 and 30 to 34 listed below. If the person engaged in both clerical and mechanical work, we have numbers representing Items 27, 28, 29, 35, 36, and 37 listed below.

- Item 22. Average annual earnings at age 20.0 to 22.0
- Item 30. Average annual earnings at age 18.0 to 20.0
- Item 23. Average level or quality of work at age 20.0 to 22.0
- Item 31. Average level or quality of work at age 18.0 to 20.0
- Item 24. Average interest in work at age 20.0 to 22.0
- Item 32. Average interest in work at age 18.0 to 20.0
- Item 25. Percentage of time employed or seeking work at age 20.0 to 22.0
- Item 33. Percentage of time employed or seeking work at age 18.0 to 20.0
- Item 26. Number of changes of employer at age 20.0 to 22.0
- Item 34. Number of changes of employer at age 18.0 to 20.0
- Item 27. Average weekly earnings at clerical work + 40, minus average weekly earnings at mechanical work at age 20.0 to 22.0
- Item 35. Average weekly earnings at clerical work + 40, minus average weekly earnings at mechanical work at age 18.0 to 20.0
- Item 28. Average level of clerical work + 6, minus average level of mechanical work at age 20.0 to 22.0
- Item 36. Average level of clerical work + 6, minus average level of mechanical work at age 18.0 to 20.0
- Item 29. Average interest in clerical work + 6, minus average interest in mechanical work at age 20.0 to 22.0
- Item 37. Average interest in clerical work + 6, minus average interest in mechanical work at age 18.0 to 20.0

The vocational data about the individuals before the age of 18.0 are recorded for later use in connection with such topics as the significance of the first job, the effect of school versus work from 16.0 to 18.0 upon later career, and changes of occupation.

In the case of individuals of the W1 group who began to work or to seek work later than the age of 18.0, all procedures are the same as noted above except that allowances are made where necessary for the fraction of the two years 18.0 to 20.0 during which they were at school. These allowances are explained in Appendix IX.

In the case of the W2 group of girls, all procedures are the same as noted above except that no computations are made for the 18.0 to 20.0 period unless the girl was at work or seeking work for at least one year of this period. Similarly for the 20.0 to 22.0 period.

In the case of the W3 group all procedures are the same as above, except that no computations are made for the 18.0 to 20.0 period and none for the 20.0 to 22.0 period unless the individual was at work or seeking work for at least one-half of the time. We included those who were primarily at work or seeking work, even though they were also attending evening classes.

For all the groups primarily working from 18.0 to 22.0 we have thus, in the great majority of cases, two independent vocational records, one for 18.0 to 20.0, the other for 20.0 to 22.0. The latter is presumably the more valuable for use as a test of the significance of each of the facts knowable at age 13.0 or 14.0 or in grade 8B.

Before using either we must consider allowing for the fact that in some individuals we use the entire period from 18.0 to 20.0, whereas in others we use only an earlier fraction of it, and in others only a later fraction of it. The same is true for the period from 20.0 to 22.0. The cases in which only an earlier fraction of the 18.0 to 20.0 period is used are chiefly the cases of girls marrying before 20.0. They are penalized because earnings are computed on the basis of work done at a younger age and at a less experienced stage than would be used if they had worked through the period. Some addition probably should be made for this.

Investigation of the influence of length of experience upon salary shows, however, that the addition will be very small. Moreover, it is probably correlated little, if at all, with the items of school record and test scores. So we make no allowance.

The cases in which only a late fraction of the 18.0 to 20.0 period is used are cases of individuals remaining in school or at home after 18.0. They have greater age, but less experience, than would have been the case if they had been working since 18.0. But it is hardly relevant to estimate what they would have earned under conditions which would have changed them radically. They have greater age than the average of the other workers with whom they are to be compared, and less experience. The cases in which only an early fraction of the 20.0 to 22.0 period is used are, again, chiefly girls who marry. As before, some addition probably should be made. But for the reasons stated above, we do not make it.⁴

Before using either period, we must also consider the modification of the measure of earnings to allow for differences in the purchasing power of the dollar, and for differences in the ease of obtaining employment and in the general wage scale. Pupils of age 15.0 at the time of the 8B test, November 1, 1922, would have the earnings of their 18.0 to 20.0 and 20.0 to 22.0 periods computed chiefly for the years 1926, 1927, 1928, and 1929. Those who were 13.0 on November 1, 1922, would have theirs computed chiefly for the years 1928, 1929, 1930, and 1931. The purchasing power of the dollar was greater in the latter case, but the ease of obtaining employment was less, and the general wage scale in New York probably lower.

Dr. Lorge has considered the need for correction of the measures of earnings and presents the facts in Appendix XII. The result is a scheme of allowances by which we correct each person's earnings to what the same individual would probably have received in purchas-

⁴ The number of changes of employer during the time from age 18.0 to age 20.0 for boys and girls who began seeking work later than age 18.0 is not entirely comparable with that for those at work or seeking work throughout the period. We have, however, left this measure uncorrected in such cases. They are few and the inaccuracy does little or no harm in any of the uses which we make of the frequency of change of employer. The same applies to the girls who left for marriage before 22.0.

If our records were used to study the relation between length of education and frequency of change of employer, or marriage and frequency of change of employer, some correction would be important.

ing power if he had been at work during 1926, 1927, and 1928. These corrections do not alter the original facts much for many individuals, since the 18.0 to 22.0 period runs back of 1926 for a few and beyond 1931 for still fewer, and since economic conditions in 1925 did not differ greatly from those in 1926. But they surely make our records of earnings more comparable.⁵

The vocational measures, thus equalized for incompleteness of period, for changes in the wage rate, and for general difficulty of obtaining employment, reveal wide differences in financial achievement. For example, the boys who were in 8B at the end of 1922, and who were at work or seeking work at age 20.0 to 22.0, were earning at that age from under \$200 to over \$5000 per year, as shown in Table 19.

For each person in the S group (primarily students at age 18.0 to 22.0) we have, with few exceptions, a record of what college or professional schools they attended, how well they did in their studies, and of their vocational careers after graduation. The last are, of course, too brief to be used in this report.

For the H groups (primarily at home with parents, or at home with parents and later with husband from 18.0 to 22.0), we have little or no information beyond the fact that they are not workers or students, and a general picture of the sort of life they lead.

⁵ The correlations for the Boys Age Group are from the uncorrected earnings, since the period from age 18.0 to age 22.0 for the youngest of the boys ended January 1, 1931, and for the two years 18.0 to 20.0, the correction factor varied only from 99.7 to 100.1, and that for the two years 20.0 to 22.0 varied only from 98.2 to 100.4, and the average correction factor for the four years varied only from 99.1 to 100.1.

Moreover, the youngest were at no disadvantage in comparison with the oldest, the period from January 1, 1927, to January 1, 1931, being as good as that from January 1, 1925, to January 1, 1929.

The correlations for the Girls Age Group were computed both from the uncorrected and from the corrected earnings. Only the latter are presented here. The differences are very slight. The correlations for the Grade Groups were computed from the corrected earnings.

TABLE 19

Average earnings per year at age 20.0 to 22.0 (Item 22). Percentage distribution for those in Boys Grade Group at work or seeking work at age 20.0 to 22.0 (n=664)

EARNINGS	FREQUENCY	EARNINGS	FREQUENCY
Under \$200	0.2	\$2,800	0.2
200	1.0	3,000	0.2
400	2.2	3,200	0.4
600	2.8	3,400	
800	10.1	3,600	
1,000	15.4	3,800	
1,200	21.7	4,000	0.4
1,400	15.4	4,200	
1,600	11.5	4,400	
1,800	8.1	4,600	
2,000	5.1	4,800	
2,200	2.0	5,000	0.2
2,400	1.2		
2,600	1.8		

IV

THE SIGNIFICANCE OF THE EARLY SCHOOL RECORD AND TEST SCORES FOR PREDICTION AND GUIDANCE

IF we know nothing whatsoever about two boys save that one has reached the last quarter of grade 8B in New York City at age 12.0, whereas the other has reached the same point at age 16.0, what can we infer about his educational career thereafter and his vocational status at age 21.0? What is the significance for later life of the age at which a certain educational level is reached? If we know nothing whatsoever about two boys, both in 8B, save that at age 14.0 one scored 50 in a test in solving arithmetical problems and comprehending paragraphs, whereas the other at the same age scored 100, what can we infer about their later careers? What is the significance for later life of the intelligence test score attained in one's early teens? These are samples of the questions we are to answer.

The first step to the use of facts in guidance is to know their significance, their predictive value. The right use of a fact in guidance depends upon other things than its significance, but it always depends upon that. In particular, if the score made in the test in assembling a clothes pin, a paper clip, a chain, a bicycle bell, etc., does not signify anything about how rapidly the boy will advance in school, or how well he will do in high school, or how much he will earn in a mechanical job, or how well he will like that job, or any of the other features of his career that we have recorded, it is presumably useless as a means of guidance.¹

So our first duty is to estimate the significance of each of the facts found at the time of the tests for the six features of the later edu-

¹ It might conceivably mean nothing for his career to age 22.0, and still be predictive of something later; and it might mean nothing for any of the features we have recorded and still be predictive of some other features. But these possibilities are so slight as to be negligible.

TABLE 20

Relation of grade reached at age 14.0 (Item 2a) to age at leaving school (Item 16). Boys Age Group ($n=266$). $r=.04$

ITEM 16	ITEM 2a																	
	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B				
	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
13.4					1	2							1					
14.0							2	3	1	1	3	4	2	1				
14.6				2	5	6	12	14	7	11	4	6						
15.2	1		2	1	5	11	11	4	18		9	4						
15.8		3	3	6	6	6	11	3	7	3	4	2	2					
16.4		1		1		3	6	2	4	1	4	3						
17.0				1	2	2	1	2	2		3	1	1					
17.6										1		1						
18.2								2			4	1		1				
18.8											1							
19.4											1							
20.0								1										
20.6													1	1				
21.2																		
21.8																		
22.4																		
23.0																		
23.6			1															

cational career (Items 16 to 21)² and for the twelve features of the vocational career (Items 22, 30, 23, 31, 24, 32, 25, 33, 26, 34, 27, 35)² which they may reasonably be expected to predict. We have gone somewhat farther than this and measured the predictive value in cases where it would be expected to be zero (Items 28, 36, 29, 37).² The method of making the computations is such that this does not add much to the expense; and the results furnish a valuable check in certain respects.

The method used is the determination of correlation coefficients.

² See pages xxii f. for definitions of these items.

TABLE 21

Relation of grade reached at age 14.0 (Item 2a) to grade reached at leaving school (Item 18). Boys Age Group ($n=266$). $r=.71$

ITEM 18	ITEM 2a															
	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B		
	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
5		2	3	3	5	1										
6		2	1	7	6	9	5	2								
7	1		1		7	18	27	19	10							
8				1		1	4	4	8	3						
9						1	5	4	18	12	20	11	1	1		
10					1		2	1	3	1	6	9	3			
11										1	2	1	1			
12											2					
13								1			3	2			1	
14																
15															1	
16			1													
17															1	

The results are presented in full in Appendices X and XI. We present in this chapter a few sample cases and then a discussion of the more important findings.

The grade reached at a given age is on the whole a symptom of general intelligence as that is usually defined by psychologists. It is also to some extent a sign of health and vigor. It is probably also a sign of freedom from burdensome home duties in the poor and from unwise social distractions in the rich. Almost any counselor would prefer that, other things being equal, a boy or girl at 14.0 should reach grade 8 rather than grade 6. As to reaching grade 10 rather than grade 8 at age 14.0, there would be more disagreement. Some would welcome this as a sign of intellect, but some would be suspicious of it as a sign of eccentricity or pedantry. Tables 20 and 21 show the significance of the grade reached at age 14.0 (Item 2a), for the age at which a pupil will leave school (Item 16), and the

grade he will reach before he leaves school (Item 18). The facts are for the Boys Age Group.

The grade reached at age 14.0 has almost no significance for the age at which one of these boys will leave school. Those who at 14.0 reach grade 8A or higher stay in school on the average only a month or so longer than those who at 14.0 had reached only 5B or lower. The correlation coefficient (Table 20) is .04.

The grade reached at age 14.0 has, on the contrary, very substantial significance for the grade which one of these boys will reach before leaving school. The correlation coefficient expressing the general tendency in Table 21 is .71. Those who at 14.0 reach 8A or a higher grade reach grade 10 on the average, while those who at 14.0 were in 5B or below advance only to the upper end of grade 6.

Tables 22 and 23 show the significance of the score made in the tests of arithmetic and reading (Item 9) for the same future facts, in the case of the same boys. The score in the test of arithmetic and reading foretells practically nothing about how long one of these boys will stay in school thereafter. Boys scoring 90 or over stay no longer than boys scoring under 40. The two columns shown below are for the bright and the dull halves in the test. Nobody could tell by looking at them which should be for the bright and which for the dull. The correlation coefficient is $-.05\frac{1}{2}$.

<i>Age at leaving</i>	<i>Duller</i>	<i>Brighter</i>	<i>Age at leaving</i>	<i>Duller</i>	<i>Brighter</i>
13.2	0	1	17.2	4	2
13.6	2	1	17.6	0	1
14.0	2	8	18.0	2	1
14.4	8	14	18.4	0	6
14.8	25	27	18.8	1	0
15.2	23	21	19.2	0	0
15.6	19	17	19.6	1	0
16.0	27	15	20.0	0	0
16.4	13	9	20.4 or		
16.8	5	7	over	2	2

Relation of score in arithmetic and reading at age 14.0 (Item 9) to grade reached at leaving school (Item 18).
Boys Age Group (n=266). $r = .54$

ITEM 18	ITEM 9																			
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	
5A	1		1		1		1													
5B	1		3		1	2	1	1	2											
6A		1	1	2	2	2	1	1	1	1		1								
6B		1		2	7		2	4	3	4				1						
7A		1	2	3	1	9	7	7	7	2	2	1	1	1		1				
7B						1	4	7	3	2	4	1	2	2	1		1			
8A							1	1	3	1	1	1	2							
8B								1	2	2	2		3	1						
9A						2	3	4	6	9	8	6	5	7	4	3	2			
9B									2	1	1	2	2	3	1	3	2			
10A				1		1	1	1	1		4	4	3				2	1		
10B							1		1		3		1		1		1			
11A						1			1	1			1	1						
11B																				
12A																				
12B									1									1		
13A				1											2	1				
13B																				
14A																				
14B																				
15A																				
15B																				
16A																				
16B									1											
17																			1	

The score in the test of arithmetic and reading does foretell the grade which one of these boys will reach much better than a chance guess would do. Boys scoring 90 or over reach 9B on the average, whereas boys scoring under 40 reach only the end of 6B. The coefficient of correlation is .54.

We have made similar tables showing the significance of the test of clerical intelligence (Item 3, C1) for the same two future facts (Items 16 and 18) in the case of the same boys. We do not present the tables here. The correlation coefficients representing them are .02 and .65.

In the case of the Boys Age Group those who at 14.0 have progressed far in school and score well in intelligence tests do not continue their schooling any longer than the laggards and the dull. They do reach much higher classes before they leave school. They will get little or no more education counted in years, but what they get is at a higher level. This is the fact stated and measured by the following formulae:

$$r_{2a\ 16} = .04$$

$$r_{9\ 16} = -.05\frac{1}{2}$$

$$r_3\ 16 = .02$$

$$r_{2a\ 18} = .71$$

$$r_9\ 18 = .54$$

$$r_3\ 18 = .65$$

In the case of a boy in that school (and this was probably true of schools attended by similar populations of children of South-European immigrants of low status) a counselor could not rely on any longer stay in school for the ablest than for the least able. We shall later find that matters were not very different for schools in general.

As our next sample, take the prediction which the score in arithmetic and reading makes concerning clerical intelligence (Item 3) tested by the I. E. R. Clerical Test, C1, a test of intelligence much less like school tasks. Table 24 shows the facts for the same boys as were used in Tables 20 to 23. The correlation is .81. Either test will predict the score in the other test rather closely.

TABLE 24

Relation of score in arithmetic and reading at age 14.0 (Item 9) to the score in clerical intelligence (Item 3).
Boys Age Group ($n=266$). $r=.81$

[illegible]

TABLE 28

Relation of average school conduct mark up to the time of the tests (Item 11) to earnings per year at age 20.0 to 22.0 (Item 22). Mechanical workers from Girls Grade Group ($n=121$). $r=.02$

ITEM 22	ITEM 11								
	36	39	42	45	48	51	54	57	60
Under \$200				1					1
\$200					1		1	1	2
400					1		1	2	1
600			1	1	1	2	4	5	1
800				3	2	2	11	7	4
1,000	1		1	2	5	5	4	11	3
1,200		1	1	1		4	5	3	6
1,400							1	5	
1,600				1		1		1	
1,800									2
2,000									
2,200									
2,400									
2,600					1				

As the next sample, to show a very accurate prediction, we present Table 25, which shows the relation between a composite of grade reached at age 14.0 and age at leaving school to grade reached at the time of leaving school in 80 of the 266 boys of the Boys Age Group. The correlation is about .95, approximately what would be found if the length of each boy's right arm were compared with the length of his left arm.

Tables 26 to 29 show the relations of various items of the test scores and school record to average annual earnings at age 20.0 to 22.0, in the case of mechanical and clerical workers from the Girls Grade Group. These correlations are low, being about .20 for the intelligence test in arithmetic and reading and about zero for the school conduct marks.

TABLE 29

Relation of average school conduct mark up to the time of the tests (Item 11) to earnings per year at age 20.0 to 22.0 (Item 22). Clerical workers from Girls Grade Group ($n=196$). $r=.05$

ITEM 22	ITEM 11							
	39	42	45	48	51	54	57	60
Under \$200					1			
\$200								3
400	1				2	1		
600						3	3	2
800			2	2		6	8	6
1,000		2	3	3	9	10	13	13
1,200	1	2	5	4	7	12	14	11
1,400			1	1	4	4	9	7
1,600				1	3	2	4	7
1,800				1	1			1
2,000								
2,200								
2,400								1

Table 30 shows the relation between annual earnings at age 18.0 to 20.0 and annual earnings at age 20.0 to 22.0 in the case of 194 clerical workers from the Girls Grade Group. The correlation is .68.

V

EDUCATIONAL PREDICTION AND GUIDANCE

TABLES 31, 32, 33, and 34 in this chapter present the correlation values resulting from about 600 separate tables like those shown in Chapter IV. They include not only the correlations measuring the significance of the test scores and school history up to the time of the tests for later educational career and success, but also intercorrelations among various facts known at that time and among the facts found later. The use made of these will be described in the following pages. All the facts in this chapter come, directly or indirectly, from Tables 31 to 34, which will be found on pages 53 to 56, or from the equivalent but more precise Tables A39, A40, A41, and A42 of Appendix X.

We have two measures of rate of progress in school up to the time of the tests. The first is the age-grade relation measured in the Boys Age Group and Girls Age Group by Item 2a, the estimated grade reached at 14.0, and in the Boys Grade Group and Girls Grade Group by Item 2r, the age at which the individual reached 8B, reversed so as to measure youngness. The second is Item 10, which is the number of half-years gained plus 10. Either of these two measures is prophetic of future educational success, which we measure by:

- Item 18. Grade reached at leaving school
- Item 19. School progress after the time of the tests until leaving school
- Item 20. Scholarship after the time of the tests
- Item 21. Educational success, a weighted composite of Items 18, 19, and 20

The correlations are given on the following page.

<i>Item 2a or 2r</i>	18	<i>With Items</i>		
		19	20	21
Boys Age Group, 2a	.711	.128	.264	.365
Girls Age Group, 2a	.837	.055	.375	.398
Boys Grade Group, 2r	.515	.087	.202	.286
Girls Grade Group, 2r	.595	.228	.166	.371
Average	.665	.125	.252	.355

<i>Item 10</i>	18	<i>With Items</i>		
		19	20	21
Boys Age Group	.684	.232	.294	.431
Girls Age Group	.539	.176	.335	.342
Boys Grade Group	.448	.165	.265	.330
Girls Grade Group	.481	.176	.202	.330
Average	.538	.187	.274	.358

We have two measures of the opinions of teachers up to the time of the tests, the average conduct mark (Item 11), and the average works mark or scholarship mark (Item 12). The former is of some predictive value; the latter of much more. The correlations are:

<i>Item 11</i>	18	<i>With Items</i>		
		19	20	21
Boys Age Group	.377	.285	.347	.389
Girls Age Group	.287	.134	.188	.172
Boys Grade Group	.288	.163	.229	.265
Girls Grade Group	.271	.124	.174	.239
Average	.305	.177	.235	.266

<i>Item 12</i>	18	<i>With Items</i>		
		19	20	21
Boys Age Group	.567	.490	.506	.617
Girls Age Group	.508	.286	.412	.377
Boys Grade Group	.444	.207	.319	.381
Girls Grade Group	.492	.227	.286	.419
Average	.502	.303	.381	.449

The record of attendance up to the time of the tests (Item 13) is predictive in the case of the school attended largely by the children of recent immigrants, but almost valueless in the case of the general sample of eighth-grade children. The correlations are:

<i>Item 13</i>	<i>With Items</i>			
	18	19	20	21
Boys Age Group	.301	.160	.225	.255
Girls Age Group	.385	.122	.276	.260
Boys Grade Group	.009	-.018	.098	.042
Girls Grade Group	.004	.013	.146	.077
Average for the Age Groups	.343	.141	.251	.258
Average for the Grade Groups	.007	-.002	.122	.060

The clerical intelligence test (Item 3) and the tests in arithmetic and reading (Item 9) are both predictive of educational success later, and equally so. The correlations are:

<i>Item 3</i>	<i>With Items</i>			
	18	19	20	21
Boys Age Group	.649	.314	.406	.505
Girls Age Group	.598	.118	.449	.369
Boys Grade Group	.415	.135	.233	.294
Girls Grade Group	.529	.302	.284	.428
Average	.548	.217	.343	.399

<i>Item 9</i>	<i>With Items</i>			
	18	19	20	21
Boys Age Group	.540	.323	.393	.481
Girls Age Group	.633	.152	.416	.378
Boys Grade Group	.424	.138	.276	.318
Girls Grade Group	.505	.273	.256	.393
Average	.526	.222	.335	.393

The test of mechanical adroitness (Item 5 or 6) was not intended

or expected to be of use in prophesying educational success, and is not. One of its merits, indeed, is that it measures an ability distinct from those which gain success in school work. Its correlations with past educational success, future educational success, and present score in intelligence tests are all low. They are lower for the boys' test (Item 5) than for the girls' test (Item 6), the latter measuring a mixture of mechanical capacity and more general factors. The correlations are:

<i>Item 5</i>		<i>Items</i>			
<i>With past educational success</i>	<i>2r</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>
Boys Age Group		.055	.010	.037	.127
Boys Grade Group	.078	.058	-.096	.038	-.020

<i>Item 5</i>		<i>Items</i>			
<i>With future educational success</i>		<i>18</i>	<i>19</i>	<i>20</i>	<i>21</i>
Boys Age Group		.054	.048	-.028	.021
Boys Grade Group		.034	-.001	.076	.049

<i>Item 5</i>		<i>Items</i>	
<i>With intelligence test scores</i>		<i>3</i>	<i>9</i>
Boys Age Group		.058	.114
Boys Grade Group		.162	.145

<i>Item 6</i>		<i>Items</i>			
<i>With past educational success</i>	<i>2r</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>
Girls Age Group		.335	.263	.298	.264
Girls Grade Group	.245	.187	.087	.210	.082

<i>Item 6</i>		<i>Items</i>			
<i>With future educational success</i>		<i>18</i>	<i>19</i>	<i>20</i>	<i>21</i>
Girls Age Group		.315	.143	.235	.229
Girls Grade Group		.167	.141	.243	.227

<i>Item 6</i>	<i>Items</i>	
<i>With intelligence test scores</i>	<i>3</i>	<i>9</i>
Girls Age Group	.446	.406
Girls Grade Group	.343	.301

We have also computed all the averages noted above, after making the Fisher allowance for variation in the correlation-coefficient scale. The differences are insignificant for our purposes. We present the results below.¹

AVERAGES OF PAGES 45 AND 46 COMPUTED BY THE Z METHOD
OF FISHER

	<i>With Items</i>			
	<i>18</i>	<i>19</i>	<i>20</i>	<i>21</i>
Item 2a or 2r	.685	.125	.253	.356
Item 10	.546	.188	.275	.361
Item 11	.308	.178	.236	.269
Item 12	.504	.308	.384	.455
Item 13 (Age Groups)	.344	.142	.251	.258
Item 13 (Grade Groups)	.007	.002	.122	.060
Item 3	.554	.219	.346	.402
Item 9	.530	.226	.337	.394

These correlations reveal that the score in a test of an hour or less, which can be given to a hundred children at once, predicts future educational success better than the progress record of approximately eight years in school, and nearly as well as the opinions of past teachers concerning conduct or ability. This fact is not only of great importance for theories of guidance, but also of immediate and wide practical utility. Such a test can be given anywhere at any time with strictly comparable results. Such a long past record of teachers' marks as we have used is hard, and often impossible, to obtain; and

¹ Throughout this report, we shall not apply the Fisher allowances unless they would change the averages significantly.

the standards of different school systems vary so much that the predictive value, when children from different school systems are compared, will be lower than that found by us, and will occasionally be grossly misleading.

It may be, however, that some ingenious combination of progress, scholarship, conduct, and attendance will provide a prophecy much better than any one of them alone, and possibly better than the intelligence test score. It may also be that a combination of some of the facts of the past educational history with the intelligence score may have even a greater predictive value. The procedure in finding what combination will give the best prophecy is extremely laborious, and we have not carried it out fully for Items 18, 19, 20, and 21, in each of the four groups. What we have done is stated in Appendix X. We shall state here only the outcomes.

The first general outcome is that the age-grade status (Item 2a or 2r), the intelligence test score (Item 9 or 3, or 3+9), and the average scholarship mark (Item 12) monopolize the predictive value of the school records and test scores. Whatever significance the tests for mechanical adroitness, school progress, conduct, and attendance (Items 5, 6, 10, and 13) have is indirect, due to their being determined in part by the same factors that determine Items 2, 9, and 12. The second is that Items 9 (or 3+9) and 12 can be used interchangeably with little loss, though Item 12 has merits, alone or in combination with Item 9 (or 3+9), which makes it a desirable feature of an individual's record. The third is that the predictions of grade that will be reached are accurate enough to deserve systematic use in advising pupils, and can probably be made very accurate indeed by combining data on family income, family interest in further schooling, and pupil's interest in further schooling with Item 2 or Items 2 and 9. The facts in more detail are stated in the paragraphs that follow.

Any counselor can obtain the age-grade status (Item 2a or 2r) from a boy or girl in five seconds and verify the statement by a letter that requires only a minute to write. He can obtain an intelligence

score as good as that obtained by the clerical plus abstract intelligence tests (Item 3 + Item 9) at small expense of time and money.² It is useful for other purposes than educational guidance.

The grade that will be reached before the pupil leaves school can be prophesied only a very little better by the best combination of all the items in the school record than by the age at which grade 8B is reached, or the grade reached at age 14.0. Such a measure of age-grade status will have a correlation of .60 to .70 with the grade the person will reach before leaving school. Nor does the inclusion of the intelligence score benefit the prophecy substantially. The best multiple correlation in the case of our data is only .02 higher than the correlation by Item 2r or 2a alone. Since an individual's age-grade status is a fact of record in every school system, and is perfectly well known to the individual himself, the practical procedure for a vocational counselor is to make his prophecy of the grade which the pupil will reach before leaving school from the age-grade status, plus such knowledge of the economic status and ambitions of the family, and of the tastes and desires of the individual as is available.

It is probable that if these latter can be assigned proper weight, the prediction of grade reached will be to an extent of $r = .90$ or higher. Grade reached is accounted for to an extent of $r = .95$ by Item 2 (age in grade 8B) and Item 16 (age at leaving school) and Item 16 should be predictable fairly closely by these factors of economic status and interest plus factors already counted in Item 2.

From the age-grade status (Item 2) and the intelligence test (Item 9) he can predict the average scholarship that will be displayed later with an r of approximately .36. If he can obtain also a fairly reliable measure of past success in school studies, he can raise the latter prediction to .42 by combining the intelligence score and this school mark with proper relative weights. If he can be sure that

² The tests can be given to large groups by one person. If a few persons are tested one at a time, the examiner has only to give them the necessary test blanks and collect them at the proper time, doing his own work in the meantime. They can be quickly scored by any intelligent clerk.

the scholarship measures are as reliable as those obtained in this study, he can, so far as educational guidance is concerned, use them instead of intelligence scores.³ Item 12 (works marks up to the time of the tests) alone has a correlation in our group of .38 with Item 20 (scholarship marks after the time of the tests). The inclusion of the intelligence rating (Item 9) with a suitable weight will improve the prophecy from Item 12 alone, raising the correlation coefficient about a twelfth of its amount. It may therefore well be included, if it is available, especially since the intelligence score would probably prove more valuable both in comparison with, and as an addition to, Item 12 if we had objective measures of the pupils' future achievement in school work in place of the teachers' marks which constitute Item 20 entirely, and in large measure determine the promotions from which Item 19 (progress in school after time of tests) is computed.

It should be remembered that the average works mark up to the time of the tests (Item 12) in this investigation included many years and the judgments of at least two teachers for each year. So full a record is rarely available for a counselor. In ordinary practice, therefore, it may be necessary or wise to use the intelligence score alone or with Item 2 (age-grade status) to predict future scholarship.

The prediction of future marks for scholarship is weak, partly because these marks themselves are affected with large variable errors, partly because the abilities and interests of boys and girls doubtless change, and partly because outside demands upon their time and energy vary widely. Our data do not enable us to differentiate between these three sorts of causes.⁴ But what is known from

³ He must be sure not only that they are so, but that they remain so in the future. He must recheck on the value of the marks year after year. With the tests no such recheck is necessary.

⁴ For the approximate effect of the first cause, see Appendix XIII. It is there shown that if perfect measures of scholarship after the test were available, the correlations in the Grade Groups would average about .63 for Item 3 or 9 with Item 20, about .73 for Item 12 with Item 20, and about .55 for Item 10 with Item 20.

this and other investigations leads us to judge that the first is much larger than is commonly supposed, and the second much smaller than is commonly supposed. Consequently, if the school marks after the time of the tests were true parallels of achievement in school work and if all pupils from 14 to 20 were equally free to devote their time and energy to school work, the correlations with Item 3 or 9 or with Item 12 should rise to .70 or more.

Our measures of the rate of progress after the time of the tests are so inadequate as indicators of the rates that would be shown if all pupils were kept on in school for five years or more that we should not attach much weight to the predictions of future rates by the multiple correlations.⁵ In the large and representative Grade Groups, Items 3, 9, 3+9, and 12 (clerical and abstract intelligence and works marks) are about equally good and are not much improved by being combined. In the Age Groups, Item 12 is better than Item 3 or 9 or 3+9 and is very little improved by having Item 3 or 9 combined with it.

⁵ For the approximate changes in the correlations, if adequate measures of school progress after the time of the tests could be had, see Appendix XIII. It is there shown that if perfect measures of rate of progress after the tests were available, the correlations in the Grade Groups would average about .62 for Item 3 or 9 with Item 19, about .58 for Item 12 with Item 19, and about .46 for Item 10 with Item 19.

TABLE 33

Correlations of school records and test scores at age 14.0 with measures of later educational success and with one another. Boys Grade Group ($n=785$). Decimal points omitted

[illegible]

V I

VOCATIONAL PREDICTION AND GUIDANCE

TABLES 26 to 30 present the relation of intelligence and conduct scores to earnings at age 20.0 to 22.0 for mechanical and clerical workers in the Girls Grade Group. Similarly, Tables A43, A44, and A45 in Appendix XI report, for all those in both Age and Grade Groups who were at work at age 20.0 to 22.0, the predictive value of each feature of the school records and tests for economic life at age 20.0 to 22.0. The predictive value is reported separately for earnings, level of job, and liking for job (Items 22, 23, 24) for boys and for girls in all groups and for mechanical workers, clerical workers, and those who worked at mixed jobs, or partly at mechanical and partly at clerical work.¹

Table 35 presents a convenient approximate picture of the facts by reporting weighted averages of the correlations ² (weights being in proportion to the number of individuals). This table is condensed from the full tables to be found in Appendix XI by combining the cases in the four Boys and Girls Age and Grade Groups.

¹ Including a few engaged in professional and special work.

² It is permissible to average these correlations since all are so low.

Since the writing of this volume, 228 more of the boys and girls tested have reached age 22.0, and their records have been studied as a supplement to the facts of Chapter VI. If these had been included with the 1,140 of the main samples, the correlations with success at age 20.0 to 22.0 would not be changed in any important particular. The differences would be: 1) that the correlations with school conduct are brought still nearer to zero; 2) that the correlations of earnings at mechanical work with school progress, scholarship, intelligence, clerical capacity, and mechanical adroitness would be raised by about .05, .04, .07, .04, and .04, respectively. For success at mixed work or at clerical work, the changes are trifling. For success at age 18.0 to 20.0, the changes are too small to deserve mention, except to note that the correlations with school conduct are brought still nearer to zero than they were.

TABLE 35

Correlations of school records and test scores at age 14.0 with earnings (Item 22), level of work (Item 23), and interest in work (Item 24) at age 20.0 to 22.0. Weighted averages from Tables A43, A44, and A45

	<i>Items</i>															
	2a, 2r	3	4	14	15	5, 6	7	8	9	10	11	12	13	16	18	
<i>Mechanical workers</i>																
(n=365)																
Item 22. Earnings	.10	.01	.09	-.06	-.04	.10	.08	.06	.08	.06	-.01	.04	.00	-.06	.07	
Item 23. Level of job	.02	-.02	.01	-.13	-.11	.14	-.02	-.01	-.01	.02	.07	.07	.02	.07	.09	
Item 24. Interest	.03	.02	.04	-.05	-.10	-.07	.05	.04	.06	.00	-.03	-.03	-.07	.01	.01	
<i>Mixed workers</i>																
(n=305)																
Item 22. Earnings	.02	.10	.01	-.01	.09	.14	.10	.12	.12	.05	-.09	.04	-.05	-.06	.04	
Item 23. Level of job	-.02	.07	.02	-.02	-.06	.11	.09	.10	.10	.01	-.04	.08	.03	.01	.06	
Item 24. Interest	.05	.02	-.04	.07	.07	.11	.08	-.02	.02	.04	.07	.02	.06	.06	.04	
<i>Clerical workers</i>																
(n=470)																
Item 22. Earnings	.19	.26	.22	.03	.02	.19	.14	.17	.17	.14	-.07	.11	.00	-.15	-.01	
Item 23. Level of job	.14	.21	.16	.06	.02	.12	.17	.13	.18	.12	-.05	.13	-.03	.05	.16	
Item 24. Interest	-.01	.10	.08	.04	.03	.04	.06	.01	.04	.01	-.01	.06	.05	-.02	-.02	

NOTE: See page xxiii for definitions of the items.

PREDICTION OF SUCCESS AT MECHANICAL WORK

Among those who engage in mechanical work, success in school to age 14.0 (Items 2 and 12) and scores in intelligence tests at that age (Items 3 and 9) are nearly valueless, and nearly equally so in predicting earnings, level of work, and interest in work at age 20.0 to 22.0. The average correlation for Items 2 and 12 with earnings is .07; that for Items 3 and 9 is $.04\frac{1}{2}$. The corresponding correlations with level are $.04\frac{1}{2}$ and $-.01\frac{1}{2}$. Those with interest are .00 and .04. The correlations for school progress (Item 10) and grade reached at leaving school (Item 18) show the same general fact.

Marks for school conduct (Item 11) give predictions at or near zero for earnings (Item 22), level of job (Item 23), and interest (Item 24), $-.01$, $.07$, $-.03$. School attendance (Item 13), which was influenced by a mixture of parental attitude, child's attitude, and child's health, gives predictions at or near zero, $.00$, $.02$, and $-.07$.

The score in the tests of mechanical adroitness (Item 5 or 6) had correlations of $.10$ with earnings (Item 22), $.14$ with level (Item 23), and $-.07$ with interest (Item 24). Items 14 and 15, derived measures of relative superiority in the tests of clerical intelligence and activities as compared with the test of mechanical adroitness (see pages 13 and 14 for formulae), have correlations of $.05$ with earnings (Item 22), $.12$ with level (Item 23), and $.07\frac{1}{2}$ with interest (Item 24).³ The score in the mechanical test is the best among our items, as is reasonable, but it is exceedingly low in predictive power.

One or both of two things must be true. Either the qualities which are productive of large earnings, high-level work, and satisfaction in the job at mechanical work at age 21.0 are very different from those which produce success in school and in tests of intelli-

³ The probable errors of these and other correlations reported in this chapter are all near $.03\frac{1}{2}$.

gence; or the individual's nature changes so that the qualities which one possesses at 21.0 are not predictable from those which he possesses at 14.0; or both of these are true.⁴

In any case, no combination of the facts gathered by us at age 14.0 would have enabled a vocational counselor to foretell how well a boy or girl would do in mechanical work six to eight years later, or how happy he would be at it. Estimating (somewhat optimistically) the prophecies for salary, level, and interest from the best possible multiple regression equation as .14, .16, and .12, the judgments of the counselor would have had about 98 per cent as much error as if he had made them by pure guess.

PREDICTION OF SUCCESS AT MIXED WORK AND AT CLERICAL WORK

The facts as to success at tasks which are a mixture of mechanical and clerical work are very much like those for mechanical work, except that the clerical and abstract intelligence test scores (Items 3 and 9) show average correlations of .11 instead of $.04\frac{1}{2}$ with earnings, and $.08\frac{1}{2}$ instead of $-.01\frac{1}{2}$ with level. The correlations with success in school work (Item 12), school conduct (Item 11), and attendance (Item 13) are at or near zero.

Success at clerical work at age 20.0 to 22.0 is predicted relatively much better than success at mechanical work or mixed work, but still very inadequately in comparison with perfection. Items 3 and 4 (clerical intelligence and clerical activities) are the most useful indicators. Their weighted average correlations with earnings at 20.0 to 22.0 (Item 22) are respectively .26 and .22. The correlations with level of job (Item 23) are .21 and .16; with liking for job (Item 24), .10 and .08.

⁴ We hope to measure those same individuals at about age 23 in tests of intellect and so determine just how far they have changed. It should be noted here that length of experience is *not* a main factor in the determination of earnings or job-level of these boys and girls at age 20.0 to 22.0. The correlations of these with youth (i.e., age taken negatively) at leaving school, which is the close parallel of length of experience at age 20.0 to 22.0, are very near zero (.06 for earnings and $-.07$ for level).

The score in the test of abstract intelligence (Item 9) gives correlations of .17, .18, and .04 respectively with earnings, level, and interest (Items 22, 23, 24). The measures of school success (Items 2, 10, and 12) average .15 with earnings (Item 22), .13 with level (Item 23), and .02 with interest (Item 24). The test in mechanical adroitness (Item 5 for boys, Item 6 for girls) shows correlations of .19, .12, and .04.⁵ School conduct (Item 11) and attendance (Item 13) show zero or slightly negative correlations as in the case of workers at mechanical or mixed work. The correlation of earnings (Item 22) with length of experience, measured by the inverse of age at leaving school (Item 16), is .15.

The multiple correlations for predicting earnings at age 20.0 to 22.0 (Item 22) from Items 3 and 4; 3, 4, and 9; 3, 4, 9, and 5 (6 for girls); and 3, 4, 9, 5 (6 for girls), and 2 have been computed for the 190 clerical workers of the Boys Grade Group and the 199 clerical workers of the Girls Grade Group. The results are shown in Table 36. The gain over the predictive value of Item 3 alone by using Items 3+4 or Items 3+4+9 or Items 3+4+9+5 (6 for girls) or Items 3+4+9+5 (or 6)+2 is trifling. The values which Items 4, 9, and 2 have are due almost entirely to the fact that they measure in part the same traits which the test of clerical intelligence (Item 3) measures. The same is true, though to a slightly less degree, of Items 5 and 6. Items 3+4+5 (6 for girls) gives a correlation only .0025 below that of the most elaborate combination. Item 3 alone is nearly as good.

The predictive value of Item 3, the test of clerical intelligence, in terms of dollar differences in annual earnings at clerical work at age 20.0 to 22.0, as derived from the correlation chart, is shown in Table 37.

⁵ It is an interesting irony that the test devised to distinguish the ability to manipulate objects from the ability to manipulate words, numbers, and other clerical items should prove to be a better indicator of success at clerical than of success at mechanical work. It is not, however, unreasonable in view of the other facts found.

TABLE 36

The values of various combinations of Items 3, 4, 9, 5, and 2r for predicting earnings at age 20.0 to 22.0; and the data from which the multiple correlations are computed

a) WEIGHTED AVERAGE CORRELATIONS WITH EARNINGS FOR THOSE IN
GRADE GROUPS ENGAGED CHIEFLY IN CLERICAL WORK

	<i>Boys Grade Group</i> (n=190)	<i>Girls Grade Group</i> (n=199)
Item 3	.21	.31
Items 3+4	.22	.32
Items 3+4+9	.22	.32
Items 3+4+9+5	.23	
Items 3+4+9+6		.33
Items 3+4+9+5 (or 6)+2	.23 (.2278)	.33 (.3335)
Items 3+4+5 (or 6)	.23 (.2256)	.33 (.3306)
Items 3+5 (or 6)	.21 (.2088)	.33 (.3253)

b) INTERCORRELATIONS USED IN COMPUTING THE CORRELATIONS WITH
EARNINGS

	<i>Item 3</i>	<i>Item 4</i>	<i>Item 9</i>	<i>Item 5</i>	<i>Item 2r</i>
<i>Boys Grade Group</i> (n=190)					
Item 22	.2062	.2075	.1290	.0614	.1712
Item 3		.7069	.5986	.1415	.6561
Item 4			.4038	.1447	.5396
Item 9				.0910	.5553
Item 5					.1353
<i>Girls Grade Group</i> (n=199)					
Item 22	.3064	.2510	.2255	.2057	.2274
Item 3		.6291	.6136	.3367	.6379
Item 4			.3555	.3225	.5012
Item 9				.3086	.5654
Item 6					.1789

NOTE: See pages xxii f. for definitions of the items.

TABLE 37

Probable earnings per year (in dollars) at age 20.0 to 22.0 at clerical work of a boy or girl making the stated score in grade 8B in the test of clerical intelligence (Item 3) as of age 14.0

SCORE	PROBABLE EARNINGS		SCORE	PROBABLE EARNINGS		SCORE	PROBABLE EARNINGS	
	<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>		<i>Boys</i>	<i>Girls</i>
10	\$1,196	\$ 985	36	\$1,398	\$1,179	62	\$1,599	\$1,372
11	1,204	993	37	1,405	1,186	63	1,607	1,380
12	1,212	1,000	38	1,413	1,194	64	1,615	1,387
13	1,218	1,008	39	1,421	1,201	65	1,622	1,395
14	1,227	1,015	40	1,429	1,209	66	1,630	1,402
15	1,235	1,022	41	1,436	1,216	67	1,638	1,410
16	1,243	1,030	42	1,444	1,223	68	1,646	1,417
17	1,250	1,037	43	1,452	1,231	69	1,653	1,424
18	1,258	1,045	44	1,460	1,238	70	1,661	1,432
19	1,266	1,052	45	1,467	1,246	71	1,669	1,439
20	1,274	1,060	46	1,475	1,253	72	1,677	1,447
21	1,281	1,067	47	1,483	1,261	73	1,684	1,454
22	1,289	1,075	48	1,491	1,268	74	1,692	1,462
23	1,297	1,082	49	1,498	1,276	75	1,700	1,469
24	1,305	1,089	50	1,506	1,283	76	1,708	1,477
25	1,312	1,097	51	1,514	1,290	77	1,715	1,484
26	1,320	1,104	52	1,522	1,298	78	1,723	1,492
27	1,328	1,112	53	1,529	1,305	79	1,731	1,499
28	1,336	1,119	54	1,537	1,313	80	1,739	1,506
29	1,343	1,127	55	1,545	1,320	81	1,746	1,514
30	1,351	1,134	56	1,553	1,328	82	1,754	1,521
31	1,359	1,142	57	1,560	1,335	83	1,762	1,529
32	1,367	1,149	58	1,568	1,343	84	1,770	1,536
33	1,374	1,156	59	1,576	1,350	85	1,777	1,544
34	1,382	1,164	60	1,584	1,357	86	1,785	1,551
35	1,390	1,171	61	1,591	1,365			

PREDICTION OF SUCCESS REGARDLESS OF THE NATURE OF THE WORK

We have determined the predictive value of each item known at the time of testing for all the workers in each of the four groups regardless of the character of their work. The correlations are presented in Table A46 in Appendix XI. They are not so instructive as facts given for different sorts of work, being in general due to differences in work plus the influence of the superiority of those who engaged in clerical work over those who engaged in mechanical or mixed work, in most items at the time of the tests and in salary. But they may be useful for comparison with other facts of the same sort.

PREDICTION OF SUCCESS AFTER AGE 22.0

It is important to learn whether the correlations found between certain facts at age 14.0 and success in clerical work at age 20.0 to 22.0 are more likely to increase than to decrease at age 22.0 to 24.0, or at age 24.0 to 26.0, and so on.

In so far as the test scores in clerical intelligence, clerical activities, and abstract intelligence (Items 3, 4, and 9) and the records of scholarship (Item 12) measure features of an individual that are fundamental and permanent, and that are valuable for clerical work in general, the prophecy the scores make of his success should hold good or become better the longer he works (up to a certain limit) and the more his work becomes known to employers and supervisors. The correlations should increase rather than decrease. On the other hand, in so far as these items measure temporary, accidental, and superficial features of a boy or girl, they will correlate better with his success in getting a job soon after the time of the tests than with his permanent success.

A continuation of the life histories of the persons concerned is the only sure means of settling the question, but a strong probability may be set up by comparing the facts at age 20.0 to 22.0 with those at age 18.0 to 20.0.

In Table 38 we compare the weighted average correlations of the

TABLE 38

Difference in the predictive value of school records and test scores at age 14.0 for clerical success at age 18.0 to 20.0 and at age 20.0 to 22.0. Weighted average correlations for Boys Grade and Girls Grade Groups.

At age 18.0 to 20.0, $n=457$; at age 20.0 to 22.0, $n=470$

	<i>2a, 2r</i>	<i>With Items</i>				
		<i>3</i>	<i>4</i>	<i>5, 6</i>	<i>9</i>	<i>12</i>
Item 30. Earnings at 18.0-20.0	.17	.19	.14	.22	.13	.02
Item 22. Earnings at 20.0-22.0	.19	.26	.22	.19	.17	.11
Change	.02	.07	.08	-.03	.04	.09
Item 31. Level at 18.0 to 20.0	.13	.15	.11	.10	.15	.12
Item 23. Level at 20.0 to 22.0	.14	.21	.16	.12	.18	.13
Change	.01	.06	.05	.02	.03	.01
Item 32. Interest at 18.0-20.0	.06	.05	.04	.01	-.01	.02
Item 24. Interest at 20.0-22.0	-.01	.10	.08	.04	.04	.06
Change	-.07	.05	.04	.03	.05	.04

NOTE: See page xxiii for definitions of the items.

items in question with annual earnings for clerical workers at age 18.0 to 20.0 (Item 30) and at age 20.0 to 22.0 (Item 22). The details appear in Tables A43 to A45 and A47 to A49 in Appendix XI. The showing is clear. The correlations with the tests of clerical intelligence, clerical activities, and abstract intelligence (Items 3, 4, and 9) are 40 per cent higher at age 20.0 to 22.0 (.26, .22, and .17 versus .19, .14, and .13).⁶

The correlations with school advancement and school marks up to age 14.0 (Items 2 and 12) are also higher (.19 versus .17 and .11 versus .02). The only one to drop is that with the test of mechanical adroitness (Item 5 or 6).⁷

⁶ This does not mean that the accuracy of the prediction is increased by 40 per cent.

⁷ This change from .22 to .19 may be a matter of chance. It may be a real difference due to the diminishing importance of the mechanical features of work in clerical positions of higher level.

TABLE 39

Difference in the predictive value of school records and test scores at age 14.0 for success at other than clerical work at age 18.0 to 20.0 and at age 20.0 to 22.0. Weighted average correlations for Boys Grade and Girls Grade Groups. For mechanical workers at both age periods, $n=361$. For those engaged in other work: at age 18.0 to 20.0, $n=300$; at age 20.0 to 22.0, $n=306$

	<i>Items</i>					
	<i>2a, 2r</i>	<i>3</i>	<i>4</i>	<i>5, 6</i>	<i>9</i>	<i>12</i>
<i>Mechanical work</i>						
Item 30. Earnings at 18.0-20.0	.13	.06	.12	.05	.05	.05
Item 22. Earnings at 20.0-22.0	.10	.01	.09	.10	.08	.04
Change	-.03	-.05	-.03	.05	.03	-.01
Item 31. Level at 18.0-20.0	.03	-.03	-.03	.16	.03	.06
Item 23. Level at 20.0-22.0	.02	-.02	.01	.14	-.01	.07
Change	-.01	.01	.04	-.02	-.04	.01
Item 32. Interest at 18.0-20.0	.03	-.01	.03	.09	.03	-.05
Item 24. Interest at 20.0-22.0	.03	.02	.04	-.07	.06	-.03
Change	.00	.03	.01	-.16	.03	.02
<i>Mixed or other work</i>						
Item 30. Earnings at 18.0-20.0	.02	.11	.04	.14	.09	.04
Item 22. Earnings at 20.0-22.0	.02	.10	.01	.14	.12	.04
Change	.00	-.01	-.03	.00	.03	.00
Item 31. Level at 18.0-20.0	.12	.11	.04	.05	.01	.08
Item 23. Level at 20.0-22.0	-.02	.07	.02	.11	.10	.08
Change	-.14	-.05	-.02	.06	.09	.00
Item 32. Interest at 18.0-20.0	.03	.01	.04	.06	-.02	.08
Item 24. Interest at 20.0-22.0	.05	.02	-.04	.11	.02	.02
Change	.02	.01	-.08	.05	.04	-.06

NOTE: See page xxiii for definitions of the items.

The correlations of clerical intelligence (Item 3), clerical activities (Item 4), and abstract intelligence (Item 9) with average level of jobs held are also higher at age 20.0 to 22.0 than at age 18.0 to 20.0—.21, .16, and .18 versus .15, .11, and .15. So also, to a less degree, for the correlations of grade reached at a given age (Item

2a) and average works mark to the time of the tests (Item 12)—.14 and .13 versus .13 and .12.

The correlations of the test scores with interest in or liking for the work done were so low at age 20.0 to 22.0 for clerical workers that it is unprofitable to compare them with those at age 18.0 to 20.0. The former averaged higher. In the case of those engaged in mechanical work, mixed work, and other work, these correlations, very low in both cases, are no higher at age 20.0 to 22.0 than at age 18.0 to 20.0. There is an average change of $-.005$ as shown in Table 39.

PREDICTION OF SUCCESS AT HIGH LEVELS

One important limitation of our work is the necessary exclusion of high levels of work save for the very few who attain them at age 20.0 to 22.0. School success and success in the tests may have different predictive values for responsible, executive, and supervisory activities than for subordinate and routine activities, just as we have found that they have different predictive values for clerical and for mechanical work.

In the case of mechanical workers, some will become executives, inspectors and foremen, and the like; some will acquire businesses of their own; some will become highly skilled craftsmen. Progress to these levels in later years may correlate more closely with scholarship, intelligence, or mechanical skill than does the success attained at age 20.0 to 22.0. In the case of clerical workers, some will advance in office work, some in selling, some in general managerial work, with or without ownership. Progress in each of these lines at later ages should be studied in relation to possible early symptoms. In the professions and in many special occupations, the significance of the facts at age 14.0 cannot be measured at age 21.0. We must wait. Our work records do not include those for the boys and girls who went to colleges or professional schools; a special report will be made on them in Chapter VII. They will be an important fraction of those who achieve professional and business careers. They will, however,

be a small fraction numerically and will not in any case alter the correlations by any large amount.

It is our opinion that success at age 22 to 32 or 42 or 52 will be somewhat more in line with the test scores at age 14.0 than early success is. There are two contrary sets of forces. One is that the individual's abilities and equipment are changed by the experiences of life so that, other things being equal, he is at forty less like himself at fourteen than he was at twenty-one. Opposed to this is the consideration that the abilities measured by the tests may have more influence at higher levels, including professional work, than in such work as is done at age 20.0 to 22.0. The ordinary view is that the former set of forces will be stronger than the latter, and we cannot disprove it. But certain general facts of psychology and the fact that the correlations are closer at age 20.0 to 22.0 than at age 18.0 to 20.0 incline us to believe that the latter may be the stronger.

DIFFERENTIAL PROGNOSIS BETWEEN SUCCESS AT MECHANICAL WORK AND SUCCESS AT CLERICAL WORK

One main purpose of the investigation was to test the possibility of predicting at or near age 14.0 whether and to what extent an individual would succeed better at clerical than at mechanical work or vice versa.

The facts given for individuals who worked only at mechanical work or only at clerical work enable us to do this, though only in probabilities of rather small magnitude. The higher the individual's score is in school advancement, clerical intelligence and activities, abstract intelligence, school progress, and scholarship (Items 2, 3, 4, 9, 10, and 12), the more his success at clerical work will surpass his success at mechanical work. Conversely, the lower an individual's score is in Items 3, 4, 9, etc., the more his success at mechanical work will surpass his success at clerical work. Evidence for this is provided by the following facts: correlations are higher with success at clerical than with success at mechanical work, as appears in Table 40; the scores of those who succeeded well enough at clerical work to justify

TABLE 40

The difference between average school records and test scores at age 14.0 of subjects from all groups engaged at age 20.0 to 22.0 chiefly in clerical work and those of subjects from all groups engaged chiefly in mechanical work

	2a, 2r	3	4	14	15	5, 6	Items							16	18
							9	10	11	12	13				
B. A.															
Act.	0.87	4.86		5.44		-5.76	-4.99	0.73	0.75	2.06	0.48	1.88	1.23		
Act./SD	.33	.33		.45		-.30	-.27	.29	.08	.23	.08	.16	.33		
B. G.															
Act.	4.60	5.45	2.82	9.52	9.11	-11.74	4.46	0.77	1.96	2.55	-0.75	8.31	2.70		
Act./SD	.43	.36	.36	.75	.68	-.58	.26	.41	.28	.38	-.21	.44	.64		
G. A.															
Act.	1.53	9.62	1.85	2.97	1.73	14.98	10.76	0.57	1.85	2.87	0.66	1.72	1.83		
Act./SD	.60	.63	.28	.37	.23	1.01	.57	.23	.26	.31	.12	.16	.56		
G. G.															
Act.	4.34	7.76	2.21	4.62	2.70	-0.93	11.48	0.71	0.93	3.04	-0.77	7.27	2.05		
Act./SD	.42	.51	.29	.52	.30	-.06	.62	.41	.18	.38	-.20	.46	.51		

NOTE: Entries on the line marked "Act." are the actual differences; those on the line marked "Act./S D" are the actual differences divided by the standard deviation of the group in question in the item in question.

The clerical average is greater than the mechanical average, except where the sign is minus.

See page xxii for definitions of the items.

them (to themselves) in continuing at it were in general higher in the items listed above than the scores of those who had similar justification for continuing at mechanical work; and finally, the correlations of the derived Items 14 and 15, measuring the relative superiority in Items 3 and 4 over Item 5 (6 for girls) with salary, level, and interest, are positive for clerical workers and negative for mechanical workers.

Another method of handling the problem is by using the records of those individuals who tried both sorts of work long enough to provide usable measures of their success at each.

The number of such individuals is too small to provide clear and emphatic results. Nearly three-fourths (73 per cent) of the boys and girls for whom we have work records spent more than 90 per cent of their working time at age 18.0 to 22.0 in either mechanical or clerical work. Nearly 10 per cent more worked at a job or jobs that included both sorts of work or neither sort, not at jobs which could be separated into clerical jobs and mechanical jobs.

We must expect fluctuations in the correlations in the four Age and Grade Groups due to the fact that we have only 50, 142, 8, and 38 individuals with separate records for at least two and a half months of work at both clerical and mechanical work at age 20.0 to 22.0, or at age 18.0 to 20.0, or in both periods.

It is to be expected that the histories of those who try both sorts of work will be especially instructive by providing measures of relative success for the same individuals at the different sorts of work. And if the investigation were extensive enough in respect of numbers and especially in length of period, this expectation would doubtless be fulfilled. If individuals A, B, C, etc., succeed demonstrably better at mechanical work than at clerical, while individuals Alpha, Beta, Gamma, etc., succeed demonstrably better at clerical work than at mechanical, the inquiry into the relative status of A, B, C, etc., compared with Alpha, Beta, Gamma, etc., at age 14.0, should be specially profitable.

In our work the inquiry so far is not profitable, partly because the number of individuals trying both sorts of work is small, but chiefly because the term of trial at one or the other sort of work is often so short as to give unreliable evidence of the degree of success, and the division of unemployed time between the two sorts of work is unreliable.⁸ More records are needed and records for a much longer time.

The unreliability of Items 27, 28, and 29, which measure the differences in earnings, level of work, and interest at age 20.0 to 22.0, is evidenced by their low correlations with the corresponding items for age 18.0 to 20.0 (Items 35, 36, 37). For the individuals for whom records of work of both sorts were available in both periods, the correlations of the C-minus-M earnings at 20.0 to 22.0 (Item 27) with the C-minus-M earnings at 18.0 to 20.0 (Item 35) were .50, .28, and $-.92$ for the Boys Age, Boys Grade, and Girls Grade Groups, respectively.⁹ For C-minus-M differences in the level of job (Item 36) and interest in job (Item 37), the corresponding correlations between the two periods for these groups were:

For level: .30, .22, and .87

For interest: .55, .38, and .76

On the whole, it is safe to infer that boys and girls who are above the average in any of our tests or any feature of school success will do relatively better at clerical work than at mechanical work. The latter pays smaller bonuses for excellence in these respects, at least up to age 22.0. It is the duller and less skilful and less scholarly who profit by choosing mechanical work.

The scientific basis for vocational guidance would consist in a set of regression equations, or tables made from them, whereby a per-

⁸ Moreover, the difference between two imperfect measures is, of course, more unreliable than either one of them.

⁹ In the Girls Age Group there were only 2 cases. The numbers for the other groups were 20, 28, and 8 respectively.

son's probability of success in various lines of work under ordinary conditions could be determined from items of observable fact concerning him.

Success could be relative to the success of other individuals in the same line of work or relative to the individual's success in other lines of work according as the information was primarily to guide employers, or primarily to guide workers.

We have taken the common and important vocational decision which a boy or girl often has to make at or near age 14: "Shall I engage in clerical or mechanical work after I leave school?" We have found that the best prediction obtainable from Items 2 to 15 of school record and test scores is .23 for boys and .33 for girls for success at age 20.0 to 22.0 for clerical work, and a little above zero for mechanical work. If the promising measures of interest, honesty, cooperativeness, persistence, and other aspects of human nature and behavior provided by Strong, Hartshorne and May,¹⁰ and others had been available then, our predictions might have been improved, nobody knows how much.

We have proved that the predictions are better at age 20.0 to 22.0 than at age 18.0 to 20.0, and so may hope that the prediction for later years may be better still.

On the whole, the vocational histories of these boys and girls are not in accord with the opinions of those enthusiasts for vocational guidance who assume that an examination of a boy or girl of fourteen and a study of his school record will enable a counselor to estimate his fitness to succeed in this, that, and the other sort of work.

Vocational counselors of a certain type would use a superior

¹⁰ Edward Kellogg Strong, *Vocational Interest Blank* (Stanford University, 1930).

Character Education Inquiry, Teachers College, Columbia University, *Studies in the Nature of Character*: I. Studies in Deceit, by Hugh Hartshorne and Mark A. May; II. Studies in Service and Self-Control, by Hugh Hartshorne, Mark A. May, and Julius B. Maller; III. Studies in the Organization of Character, by Hugh Hartshorne, Mark A. May, and Frank K. Shuttleworth (New York: Macmillan, 1928, 1929, and 1930).

record for conduct in school as evidence that the boy would be co-operative and dependable at work, a superior attendance record as evidence that he would be faithful and regular at work, rapid progress in school as evidence that he would be ambitious and eager to learn in business, and the like. They would accept the school records, the test scores, and their personal impressions of a boy or girl of fourteen or fifteen at par as indexes of his future behavior as a worker.

Better predictions than ours can come only from fuller or more suitable data than ours. Such data may consist of objective facts about the child or the counselor's personal impressions of him. The value of the former must be ascertained by following the careers of persons as we have done, and finding the predictive value by correlations and multiple-regression equations. The value of the latter will depend upon the ability and experience of the counselor and can be ascertained for any given counselor or group of counselors only by following the careers of the persons rated.

It is natural that counselors should feel confidence in their personal impressions. They would be less courageous and comfortable in their work if they did not. Probably many of the counselors who read this chapter will feel that if their personal impressions could have been added to the data about these boys and girls the predictions would have been markedly improved. But this has never been proved.

The authority of the experiences of counselors in general is more or less vitiated because no systematic and adequate follow-up of this advice is made, and those persons who have done well and feel satisfied and grateful are naturally the ones who report on their later careers.

Our findings not only contradict the expectations of many vocational counselors; they also seem to contradict the actual findings of many investigators in industrial psychology who have obtained substantial correlations between scores in various tests and success at various forms of mechanical work, and much higher correlations

than .33 between scores in various tests and success at various forms of clerical work.¹¹ The contradiction in this case is probably not real, the tests being given as a rule at much later ages than 14.0, and under conditions different from ours and, what is probably still more important, success being measured by very different criteria.

The tests have usually been given to employees at the work in question or to applicants for such work. In the former case, they measure the ability the person had at age 14.0 as modified by his life since then, including his training at the work in question. In the latter case, they measure his ability at age 14.0 as modified by his life since then, including the degree of interest and effort which a test for employment at the work in question evokes from him. It is possible, and indeed fairly probable, that these same employees or candidates who showed in the investigations in question substantial correlations with test scores, might have shown much lower correlations if they had taken the tests at age 14.0 in school or in the office of a vocational counselor, as a prelude to general guidance.

In the case of employees, success at the work has usually been measured by ratings given by foremen or supervisors, or by production records, such as the quantity, or quality, or both, of the product produced per unit of time, under the conditions of work for that employer. In the case of applicants, success has been measured by similar ratings and records or by the percentage that were "satisfactory" compared to the percentage from earlier methods of hiring, or by some other evidence that the employer's business has profited from having employed the high-scoring applicants rather than the others. It is possible that records of the earnings, job level, and interest of these employees or candidates might show less correspondence with the test scores. If employees or candidates comparable in test scores, but working for many different employers were studied, the correspondence might be still less.

¹¹ Statements of the facts may be found in: F. Baumgarten, *Die Berufseignungsprüfungen* (Munich: R. Oldenbourg, 1928); H. E. Burtt, *Principles of Employment Psychology* (New York: Houghton Mifflin, 1926); C. S. Myers, *Industrial Psychology* (Chicago: Henry Holt, 1929); M. S. Viteles, *Industrial Psychology* (New York: W. W. Norton, 1932).

Any one employer may pay the same wage to employees of varying competence. And the same degree of competence may receive varying wages from different employers, some of whom choose and retain workers more advantageously than others. Suppose that some omniscient personnel officer or psychotechnologist had measured exactly the utility of each of our boys and girls to their employers during the two years at age 20.0 to 22.0. Suppose that we computed the correlations of these perfect measures of service with earnings, on the one hand, and with test scores, on the other. The correlation with earnings would surely not be perfect, and it might well be as low as .50 or .60. We do not know how fully employers get the value of what they pay for, and employees of what they give. The correlation of these perfect measures of service with test scores might then be as high as .60, and still the correlation of test scores with earnings be only .30. Our correlations were surely lowered somewhat below the correlations between test scores and such perfect measures of the values of services rendered, by the failures of employers to get equal values per dollar of wages, and the failures of the boys and girls to get equal wages per unit of services rendered.

A concrete case may show the importance of the facts presented in the last few pages. O'Rourke, in 1922, tested ninety clerks with a general clerical test, obtaining a correlation of .64 with the efficiency ratings given to these clerks. They were chosen for experimental purposes from the office of the Federal Civil Service Commission, and the efficiency ratings were obtained with great care.¹²

The test used by O'Rourke was very similar to our test of clerical intelligence. (Item 3). The Institute of Educational Research of Teachers College has had the privilege of cooperating with Dr. O'Rourke since 1921. Dr. Toops, then of the Institute, and Dr. O'Rourke were in close consultation when our test and his test were constructed. His is presumably somewhat better, being the later and being based on the experience we had and more. But I am confident

¹² H. A. Filer and L. J. O'Rourke, "Progress in Civil Service Tests," *Journal of Personnel Research*, vol. 1, pp. 484-520 (1923).

that Dr. O'Rourke himself, or any other competent judge, would expect that if our Item 3 had been used by O'Rourke with his ninety clerks, he would have got a correlation close to .60. Using it with our group and correlating with earnings from 20.0 to 22.0, we get .21 for boys and .31 for girls. The difference is presumably due to the differences in the age, etc., of the persons tested and the measures used for success.

There need not be, and in the writer's opinion there is not, any real contradiction between the results of scientific investigations of tests given to select employees and the results stated in this report.

COMPARISONS WITH OTHER INVESTIGATIONS

Dr. Helen T. Woolley studied the records of boys and girls in Cincinnati who were in industry and compared them with school records. She reports no correlation between earnings and grade completed at age 14. "Wages bore no relation to school grade completed during the first four years in industry. This remained true whether wages were measured by total yearly earnings or by average weekly wages for the time employed. The statement holds for both sexes."¹³

For tests, Woolley found lower predictive values averaging below .07, as shown in Table 41.

Woolley's testing was done in 1911 to 1915, and the tests and the methods of combining the scores to obtain her average in mental tests were not such as would be chosen now. The tests were, however, with one or two exceptions, suitable for insertion in a battery to test intelligence and alertness, and Woolley's average percentile rank probably has very closely the same significance as any standard intelligence examination of today. If she had used the most promising tests of 1931 and had combined them by suitable multiple regression equations, her average correlation of .07 with earnings per year could hardly have doubled. There is some evidence in her work

¹³ Helen Thompson Woolley, *An Experimental Study of Children at Work and in School between the Ages of Fourteen and Eighteen Years* (New York: Macmillan, 1926), p. 733.

TABLE 41

Correlation of average percentile ranks in mental tests with earning capacity and regularity of employment

(WOOLLEY, TABLE 605, P. 606)

	BOYS	GIRLS
<i>Correlation with total yearly wage</i>		
At age 14	.09	.08
At age 15	.10	.03
At age 16	.09	.12
At age 17	.02	.004
<i>Correlation with average weekly wage</i>		
At age 14	.09	.02
At age 15	.08	.05
At age 16	.02	.10
At age 17	-.09	.01
<i>Correlation with number of weeks employed</i>		
At age 14	.03	.05
At age 15	-.001	-.07
At age 16	.002	.10
At age 17	.12	-.02
<i>Correlation with number of positions held</i>		
At age 14	.13	-.07
At age 15	.09	-.03
At age 16	-.06	-.02
At age 17	.06	-.007

that if she had computed predictive values for mechanical and clerical workers separately, the correlations would have been higher than .07 for the latter, but they would very probably have been lower for the former.

In general, Woolley's extensive and painstaking work at ages 14 to 17 gives no grounds for suspicion of our result at ages 18.0 to 20.0.

There are two other valuable investigations which included a follow-up of the vocational careers of boys and girls who had been tested (and also, in these investigations, advised). The first was

made in London by F. M. Earle and others of the staff of the National Institute of Industrial Psychology, directed by C. S. Myers, and advised by a distinguished group of educators, social workers, and psychologists.¹⁴ The second was made in Birmingham by Allen and Smith, who were trained under Myers and had full cooperation from those engaged in the London inquiry.¹⁵

We shall not describe these investigations in detail, but only sufficiently to make certain conclusions intelligible. In London the tests were made in 1925 and 1926 of children from 13 years 9 months to 14 years, and their industrial histories ran from 2 years 7 months to 4 years thereafter. The examination of the school record, the testing, and the personal interviews were elaborate, painstaking, and representative of the very best that the world had to offer at that date. A careful medical examination was also made, and the implications for vocational life recorded. Expert and sagacious counselors studied the facts for each child and gave him the best advice they could as to general and special lines of work to seek and avoid. They recorded the advice they gave to each, and later compared the success of those whose work was most congruous with the recommended work with the success of those whose work was less so, reporting the results in detailed fashion.

The measures or symptoms of success which they used were length of tenure, employers' ratings of satisfactoriness, and employees' ratings of liking or disliking. They found that when the job was like the sort which they had recommended as suitable and at which they had predicted success, the tenure was longer, the employer more often satisfied, and the boy or girl more often contented, than when the job was unlike the sort recommended. The facts are presented somewhat optimistically, and most readers will

¹⁴ F. M. Earle, and other members of the staff of the National Institute of Industrial Psychology, *Methods of Choosing a Career* (London: George G. Harrap & Company, Ltd., 1931).

¹⁵ E. Patricia Allen and Percival Smith, *The Value of Vocational Tests as Aids to Choice of Employment* (Birmingham, England: Treasurer's Department, Council House, 1932).

T A B L E 42

Relation between the degree of accordance with the recommendation made by the counselor and 1) ratings of success by employers, and 2) ratings of liking by employees, for work done from 14.0 to 17.0 (approximately). Each entry is the number of posts having the rating listed above and at the left.

(CONDENSED FROM EARLE, TABLES LIII TO LX, PP. 267-275)

a) USING EMPLOYERS' REPORTS

	Boys: All posts					Boys: Present posts					Girls: All posts					Girls: Present posts								
	1		2		3		1		2		3		1		2		3		1		2		3	
	2+	2-	2+	3	3	3	2+	2-	2+	3	3	2+	2-	2+	3	3	2+	2-	2+	3	2+	2-	2+	3
A	11	7	37	3	3	3	7	4	23	2	1	17	4				18	5	14	1	2			
B	7	12	54	7	9	9	3	6	38	3	4	8	3				10	6	40	5	1			
C	15	16	97	10	29	29	7	9	58	4	3	8	5				4	3	39	5	7			
D	3	3	35	3	12	12	3	2	18	2	6	3	3				1	3	13	2	4			
E		1	3		2	2			2		1		1											

b) USING EMPLOYEES' REPORTS

	Boys: All posts					Boys: Present posts					Girls: All posts					Girls: Present posts				
	<i>I</i>		<i>II</i>		<i>III</i>	<i>I</i>		<i>II</i>		<i>III</i>	<i>I</i>		<i>II</i>		<i>III</i>	<i>I</i>		<i>II</i>		<i>III</i>
	<i>II</i> +	<i>II</i> -	<i>II</i> +	<i>II</i> -	<i>III</i>	<i>II</i> +	<i>II</i> -	<i>II</i> +	<i>II</i> -	<i>III</i>	<i>II</i> +	<i>II</i> -	<i>II</i> +	<i>II</i> -	<i>III</i>	<i>II</i> +	<i>II</i> -	<i>II</i> +	<i>II</i> -	<i>III</i>
A	3	3	29	6	12	2	2	21	4	2	9	2	30	4	8	8	4	30	4	2
B	2	6	39	12	33	1	4	30	8	8	3	1	36	7	16	3	28	4	4	4
C	1	1	80	11	57	1	51	7	16	16	7	2	49	5	33	3	1	38	4	7
D	1	3	37	7	22	1	1	24	2	3	5	19	2	10	10	3	16	2	2	2
E	1		3		3						2	1		1			2			

NOTE: A, B, C, D, and E are degrees of congruity between the recommendation made and the post in question, A being highest, B next, etc.

1, 2+, 2-, and 3 are degrees of satisfactoriness of the employee to the employer, 1 being highest, 2+ next, etc. I, II+, II-, and III are degrees of satisfactoriness of the post to the employee, I being highest, II+ next, etc.

tend to conclude that they are in sharp contrast to our modest claims for the predictive value of facts known at age 14.0. But the degrees of correspondence between the vocational histories and the recommendations or predictions were in fact of the same order of magnitude as those reported by us.

The facts as reported by Earle are shown in Table 42. The correlations are as follows:¹⁶

Congruity of recommendations and employers' estimate of satisfactoriness

Boys: All posts held	.19
Boys: Present posts only	.16
GIRLS: All posts held	.31
GIRLS: Present posts only	.35

Congruity of recommendation and employers' estimate of satisfactoriness

Boys: All posts held	.06
Boys: Present posts only	.07
GIRLS: All posts held	.10
GIRLS: Present posts only	.13

The correlations are, as with us, higher for girls than for boys, and higher for the employers' ratings, which are akin to our items of earnings (22 and 30) than for the employees' likings, which are closely akin to our items of interest in the job (25 and 32). If actual earnings replaced the employers' estimates, the .19, .16, .31, and .35 would presumably have been lower, in view of the facts stated on pages 59 to 72.

There is thus no conflict between the London results and ours. If the careers of the 600 boys and girls studied in London are followed to age 22.0, and if measurements of tenure, earnings, dignity of job, and liking for job are then correlated with congruity with the recommendations or prophecies made at the time of the test, the

¹⁶ We calculate Pearson coefficients of correlation, though the data are not entirely suitable to serve as bases for such computation. Any impartial rough measure of the closeness of the correspondence is all that is required.

correlations should be somewhat higher than ours, because the tests and interview included determinations of interests, temperament, and physique which ours did not. But there is little probability that they will be much higher.

The Birmingham investigation was in general like that in London. There were minor changes in the tests used and the methods of following the children's careers, and the period followed was two years in every case. The jobs which were in accordance with the recommendations were held longer than those which were not. Employers rated the worker as suitable for the job and employees rated the work as suitable for them more often for the "accordance" than for the "non-accordance" posts.

The degree of correspondence between vocational success and the recommendations is hard to determine, because Allen and Smith obtained these ratings of suitability for less than half of the cases, and because the ratings may have been influenced by knowledge on the part of the employers and children that the Juvenile Employment Office had or had not recommended the child or the job as suitable.

Their reports give the frequencies of "unsuitable," "suitable," and "very suitable" in relation to congruity with the recommendations, as shown in Table 43.¹⁷ If we assume that the other cases omitted because of insufficient information would follow the same tendencies, the correlations between recommendation and suitability would be .57, .43, .74, and .76 for the employers' ratings of first post, employers' ratings of last post, children's ratings of first post, and children's ratings of last post, respectively.¹⁸ If we assume that the omitted cases would be cases of mediocre suitability, the corresponding correlations would be .45, .35, .55, and .49. Even the latter are much above the London correlations, and above what we have found in the present inquiry. In the London inquiry and in ours,

¹⁷ We combine their tables for boys and girls, because of the scantiness of the data.

¹⁸ We determine the correlations by the Bi-serial Eta method as described by T. L. Kelley, *Statistical Method* (New York: Macmillan, 1923), p. 250.

TABLE 43

Relation between the degree of accordance with the recommendation made by the counselor and employers' and employees' ratings of suitability of job to employee. Each entry is the number of posts having the rating listed above and at the left

(CONDENSED FROM ALLEN AND SMITH, TABLES 16, 18, 20, 22, 24, 26,
PP. 20, 21, 22, 31, 32)

a) UNRATED POSTS OMITTED

	<i>Employers' Ratings</i>						<i>Employees' Ratings</i>					
	FIRST POST			LAST POST			FIRST POST			LAST POST		
	U	S	VS	U	S	VS	U	S	VS	U	S	VS
A.	1	14	12	1	30	22	3	15	11	0	13	9
N.A.	4	2	1	5	8	4	22	4	1	5	8	3

b) UNRATED POSTS ENTERED AS S—

	<i>Employers' Ratings</i>						<i>Employees' Ratings</i>					
	FIRST POST			LAST POST			FIRST POST			LAST POST		
	U	S—	S	VS	U	S—	S	VS	U	S—	S	VS
A.	1	65	14	12	1	53	30	22	3	63	15	11
N.A.	4	51	2	1	5	27	8	4	22	31	4	1

NOTE: U = unsuitable. S = suitable. VS = very suitable.

S— = unreported, treated in computation as less suitable than S.

A. = in accordance with the recommendation.

N.A. = not in accordance with the recommendation.

the opinions of the employers (expressed in our inquiry by earnings) show much higher correlations than the opinions of the employees, but in the Birmingham inquiry the reverse is emphatically the case. These differences could be accounted for if the employers and the children were influenced in their ratings of suitability by the recommendations and whatever discussion accompanied them.

It is our opinion that the contrast between the results of Allen and Smith and our results will largely disappear if they secure objective records of earnings and level of job and impartial records of liking for the job. We have confidence that the correlations will

TABLE 44

Correlations of number of changes of employer (Item 26) at ages 18.0 to 20.0 and 20.0 to 22.0 with earnings (Items 22 and 30), level of job (Items 23 and 31), and interest in job (Items 24 and 32); and also with various items of fact known at the time of the tests. Mechanical and clerical workers in the Boys and Girls Grade Groups

BOYS AND GIRLS GRADE GROUPS				
<i>At age 20.0 to 22.0</i>		M and C (n=882)		
Item 22. Earnings				.15
Item 23. Level				.08
Item 24. Interest				.09
<i>At age 18.0 to 20.0</i>		M and C (n=862)		
Item 30. Earnings				.11
Item 31. Level				.04
Item 32. Interest				.09
	BOYS GRADE GROUP		GIRLS GRADE GROUP	
	M	C	M	C
	(n=139)	(n=180)	(n=121)	(n=194)
<i>At age 14.0</i>				
Item 2r. Age at time of tests				
(reversed)	.17	.16	.07	— .10
Item 3. Clerical intelligence	.12	.09	.07	.03
Item 4. Clerical activities	.01	.07	.14	.05
Item 5 (or 6). Mechanical				
adroitness	.19	.04	— .05	.05
Item 9. Abstract intelligence	.01	.00	.12	— .03
Item 12. Works mark	.11	.09	.04	— .14

be somewhat higher than ours, because their examination of the children was more extensive and searching, but not much higher.

In the reports of the London and Birmingham studies, infrequency of change of employers is used as a chief criterion of the validity of the recommendations made. We rate its value far below that of earnings, level of job, or liking for job, since it is an unim-

portant feature of vocational success except in so far as it is symptomatic of these three items. Our records show that it is so only to a very slight degree. In the Boys and Girls Grade Groups, the average correlations with these three symptoms of success are, respectively, .15, .08, and .09 at age 20.0 to 22.0, and .11, .04, and .09 at age 18.0 to 20.0 (see Table 44). The correlation between annual earnings and liking for jobs, on the contrary, is .28 at age 20.0 to 22.0, and .27 at age 18.0 to 20.0. The correlation between earnings and level of job is .44 at age 20.0 to 22.0, and .42 at age 18.0 to 20.0.

Workers in vocational psychology should be very cautious about using infrequency of change of employer as a measure of vocational success. Its correlations with annual earnings, level of jobs, and liking for jobs are far too low.

For reference, we also report in Table 44 the correlations (for the clerical workers and mechanical workers in the Grade Groups) of the number of changes of employer in the four years from age 18.0 to 22.0 with scores for school advancement, clerical intelligence and activities, mechanical adroitness, abstract intelligence, and scholarship (Items 2r, 3, 4, 5 or 6, 9, and 12). All are low. The unweighted averages are, in order, .08, .08, .07, .06, $.02\frac{1}{2}$, and $.02\frac{1}{2}$.

VII

SPECIAL GROUPS

THIS chapter will describe briefly the status at age 14.0 of those who by age 22.0 had distinguished themselves in various ways, good and bad, as by attending college, by being convicted and sentenced for a criminal offense, by being seriously ill, or by going into business for themselves. Instead of observing, as we have so far done, what happens to boys and girls according to their school records and test scores, we observe what the school records and test scores were of persons according to their careers.

THE COLLEGE GROUP

From the facts of Chapter IV it is known that the persons who score high in school advancement (Items 2a or 2r and 10) clerical intelligence (Item 3), abstract intelligence (Item 9), and scholarship (Item 12), have far above average probability of reaching the college level. The college group is in fact made up of many intellectually able boys and girls who graduate from high school at 18 or earlier, some ordinary ones, and a few dull ones who reach college at 19 or 20 with parental aid in the form of special schooling, tutors, and the like. Of the Boys Grade Group there were 73 (nearly one in ten) who completed at least one semester of "regular" or day college education. Fifty-nine of these were admitted to colleges having high standards, 14 to colleges less exacting. The mean score of the 59 as shown in Table 45, was $+.95$ and $+.87$ in Items 2r and 10 (the two measures of rate of school progress), and $+.84$ and $+.87$ in Items 3 and 9 (the two tests of intelligence) and $+.91$ in Item 12 (scholarship marks). Here and elsewhere in this chapter $+$ and $-$ will signify superiority and inferiority in the trait in question to the mean of the entire group (Boys Age Group, 266; Girls Age Group,

200; Boys Grade Group, 785; Girls Grade Group, 905);¹ 1.00 will equal the standard deviation of the entire group (this is about one-sixth of the difference between the best individual in the entire group and the worst, and half the difference between the person who ranks 159 in a thousand and him who ranks 841 in a thousand). In Item 4 (clerical activities, a test measuring a mixture of intellectual and sensori-motor abilities) their mean was $+.49$. In Item 11 (school conduct marks) it was $+.40$. In the mechanical test (Item 5) it was $+.18$. In school attendance (Item 13), it was $-.02\frac{1}{2}$.

The less exacting colleges receive students who are much less able (or, at least, were so at age 14.0), though still much above the mean for the entire group. The facts for them are:

Items 2r and 10. School advancement	$+.30\frac{1}{2}$	and $+.39$
Items 3 and 9. Intelligence	$+.32$	and $+.54$
Item 12. Scholarship		$+.44$
Item 4. Clerical activities		$+.20$
Item 11. Conduct		$+.22$
Item 5. Mechanical adroitness		$+.18$

There were only 5 boys of the 266 in the Boys Age Group who reached college. The facts for these five are closely like those for the 59 noted above.

Of the 905 girls in the Girls Grade Group, 40 completed at least one semester in day colleges, and 25 did so in training schools for teachers. The mean scores of the 40 in items 2r, 10, 3, 9, and 12 were, respectively, $+1.15$, $+1.01$, $+1.16$, $+1.14$, and $+.97$. The

¹ The means of the Boys and Girls Age Groups were lower than those of the Boys and Girls Grade Groups. The means for all fourteen-year-olds in New York City would be between the two and nearer the Boys Grade and Girls Grade means. We suggest that anyone who wishes to transmute the measures in this chapter into divergences from the means of all fourteen-year-olds, should use the Boys Grade and Girls Grade means minus about two-tenths of the standard deviation in the case of Items 2, 3, 4, 7, 8, 9, 10, and 12, and minus about one-tenth of the standard deviation in the case of Items 4 and 6. The means for Items 5 and 13 may be reduced a trifle or used without change.

mean scores for the 25 in these items were, respectively, $+.98$, $+.89$, $+.88$, $+.90$, and $+.69$. The facts for Items 4, 6, 11, and 12 will be found in Table 45.

Only one girl of the 200 in the Girls Age Group (largely children of recent immigrants) went beyond high school, and we do not report her early record.²

THE EVENING COLLEGE GROUP

Of the 785 boys forming a representative sampling in grade 8B (the Boys Grade Group), 72 completed at least one semester of college education in evening classes. This group is of great interest. In many American cities, if free collegiate education were provided in the evening, there would be, as in New York, as many male entrants as in all the "regular" colleges attended by the boys of the cities in question. What sort of boys would they be? Would they be primarily lovers of learning, or of prestige? Would they be the ablest from among workers or only the enterprising and ambitious? Would they in later careers surpass the more favored boys who obtain a college education with less work and sacrifice? If the right boys and girls are helped by it, free evening college education for workers seems a highly desirable social undertaking for any large city. We hope to follow the careers of these 72 boys long enough to provide valuable information. For the present we report the sort of records they made at age 14.0.

These boys were not equal intellectually to the 59 who entered the better colleges, but were better than those entering those less good, and much better than the general average. The facts appear in Table 45.

The same is true of school progress and marks for scholarship. In conduct they were better than either regular college group. In the mechanical test they were below both. The picture is not of boys of extraordinary ability, but rather of ambition and devotion.

Nine boys of the 266 in the Boys Age Group attended evening

² It was good.

T A B L E 4 5

The status at age 14.0 of boys and girls in Grade Groups who attended college, teachers training schools, or evening high schools. Weighted average divergences of the test scores at age 14.0 from the means of the group in question

<i>Grade Group: Boys</i>	<i>2r</i>	<i>Items</i>										<i>6</i>
		<i>10</i>	<i>3</i>	<i>9</i>	<i>12</i>	<i>11</i>	<i>13</i>	<i>4</i>	<i>5</i>			
At "good" day colleges (n=59)	.95	.87	.84	.87	.91	.40	-.03	.49	.18			
At less good day colleges (n=14)	.39	.39	.32	.54	.44	.22	-.10	.19	.18			
At evening colleges (n=72)	.64	.55	.53	.63	.64	.50	-.08	.45	-.02			
At evening high schools (n=32)	.15	.11	.25	.11	.22	.20	-.00	.38	.01			
<i>Grade Group: Girls</i>												
At day colleges (n=40)	1.15	1.01	1.16	1.14	.97	.46	.00	.73	.17			
At teachers training schools (n=25)	.98	.89	.88	.90	.69	.34	-.06	.57	.57			
At evening colleges (n=25)	.72	.21	.70	.68	.83	.58	.01	.53	.21			
At evening high schools (n=15)	-.43	-.56	-.09	-.33	-.30	-.23	.07	.13	.49			

NOTE: The average of the particular group is higher than that of the entire group, except where the sign is minus.
See page xxii for definitions of the items.

college. They were somewhat less able in intellect and school success than the 72 just described, but were high in comparison to the general average in the school whence they came.

The 25 evening college girls, all from the Girls Grade Group, were below both the regular college group and the teachers training group in intellect and rate of progress in school, but between the two in marks for scholarship, and above both in conduct. The facts are given in Table 45. As reported on page 87, only one girl from the Age Group went beyond high school.

THE EVENING HIGH SCHOOL GROUP

Thirty-two boys from the Boys Grade Group completed at least one semester of high school education in evening school classes. They average a little above the mean for the entire group. There were also 10 boys from the Boys Age Group who attended evening high school. They were very high, relative to the mean for their school, being about on a level with the 32 Boys Grade boys. The 15 girls from the Girls Grade Group attending evening high school average below the Girls Grade mean. None of the Girls Age Group attended evening high school.

On the whole, the boys and girls who attended evening high schools were little different from the general run of pupils in grade 8B.

DELINQUENTS

Eight boys of the Boys Age Group and three of the Boys Grade Group are known to have been convicted for criminal activities (before age 22.0) for which jail sentences in excess of thirty days were imposed. These numbers represent 3 per cent of the Boys Age Group and one-third of one per cent of the Boys Grade Group. The Boys Age Group lived, at the time of testing, in the area of New York City having the highest criminal rate and were, for the most part, children of recent immigrants. In general, these future criminals are mediocre or poor in measures of school progress and scholar-

TABLE 46

The status at age 14.0 of boys and girls who became criminals, notably immoral persons, or loafers. Weighted average divergences of the test scores at age 14.0 from the means of the Boys Age or Girls Age and Boys Grade or Girls Grade Groups

	<i>Items</i>						
	2+10	3+9	12	11	13	4	5, 6
Age Groups (n=16)	-.63	-.63	-.80	-.56	-.37	-.19	-.43
Grade Groups (n=13)	-.50	-.16	-.50	-.42	-.48	-.50	+.01

NOTE: The minus sign indicates that the average of the particular group is lower than that of the entire group.

See page xxii for definitions of the items.

ship. The inferiority in conduct marks is greater for this group than for any other observed in the inquiry. Even so, these eleven boys show far from a perfect correlation between school conduct and later conduct. They were by no means the eleven worst boys in the estimation of their teachers, but averaged at about the fifteenth percentile. The attendance of the two groups was $-.60$ and $-.50$ from the respective means of the Boys Age Group and Boys Grade Group. These attendance marks may reflect aspects of early truancy.

Only two girls in the Girls Age Group and two in the Girls Grade Group are reputed to be immoral. These four girls were inferior in school progress, intellect, and conduct. In attendance, however, they are not markedly different from their fellows.

Fourteen boys and girls are reputed to be so lazy that they are considered parasites upon the family. These loafers, in general, were inferior in measures of school progress, intellect, skill, scholarship, and school marks for conduct and skill.

In general, these persons, who are definitely criminals, or of evil repute, or of such laziness as bears heavily upon homes that can ill afford it, were much inferior at age 14.0 to their fellows who

worked or went to school from 18.0 to 22.0. The weighted averages for progress in school (Items 2a or 2r + 10), scholarship (Item 12), intelligence (Items 3 + 9), mechanical skill (Item 5 or 6), clerical activities (Item 4), conduct in school (Item 11), and school attendance (Item 13) were as shown in Table 46.

PERSONS DEAD OR SERIOUSLY ILL BEFORE AGE 22.0

Thirty-nine boys and girls died before reaching age 22.0. In general, these persons were inferior at age 14.0 to their fellows who survived them. In but two measures do these persons who died before age 22.0 surpass their fellows at age 14.0. One is the measure of grade reached, +.04, and the other, strangely enough, is attendance, +.08. There is no evidence in their entire school attendance record of unusual absences for any cause. The general psychological theorem that all positive traits are correlated positively is here demonstrated in reverse; negative traits are correlated negatively. Death, contrary to the widespread old wives' tale, does not select the good or the gifted. Death comes earlier to the mediocre, to the inferior, to those not fully equipped for life's battles.

Thirty-six boys and girls lost more than 10 per cent of the work period from age 18.0 to 22.0 because of serious illness or traumatism. These persons at age 14.0, however, probably did not differ significantly from their fellows, being plus in one measure of intellect and minus in the other, being minus in scholarship and plus in school progress. The mediocrity of this group is obvious in all traits. This group of individuals who later became sick deviated only $-.15$ in attendance.

PERSONS EMPLOYED BY RELATIVES

Ninety-nine boys and girls were employed for more than twenty per cent of the period from age 18.0 to 22.0 by some obvious member of the family, such as father, uncle, brother, or cousin. It is interesting to note that these 99 persons in general tend to be inferior to the total sample in which they were tested. The averages

indicate that this inferiority is not marked. Yet the consistency of the negative deviations from the respective means in all traits may indicate that those persons who find employment under some family member may be wanting in initiative, in intellect, or in independence.

SELF-EMPLOYMENT: EARLY ENTREPRENEURS

Thirty-two persons worked for themselves on a full-time basis for more than two months during the age period 18.0 to 22.0. The two-month period was never self-employment in a second or secondary job. These persons in general tend to be inferior to the sample from which they were selected. In the two measurements of intellect, they are $-.44$ and $-.35$ respectively. Their deviations from their fellows' means at age 14.0 are: in rate of school progress $-.39$; in scholarship, $-.14$; in conduct, $-.17$; in attendance, $+.04$. It is realized, of course, that self-employment does not require a marked intellect, but it seems evident, nevertheless, that these persons were not endowed with the traits that are considered necessary for success at self-employment. It is too early to say how far these persons are successful, but it is known that many of them are not. The self-employment was often due to motivation from the family when the person had been unemployed. The family decided that it was better to have the boy working at something than nothing at all, and therefore made the necessary investment in a business for him. Others precipitately engaged in self-employment without weighing the consequences of their acts. On the whole, early self-employment is probably by no means as favorable a symptom as it has been considered.

THE COMPARATIVE ABILITIES OF GIRLS WHO DO AND DO NOT WORK OUTSIDE THE HOME, EXCLUDING THE GIRLS WHO ATTENDED COLLEGES OR TEACHERS TRAINING SCHOOLS

Among the 905 girls forming a representative sampling of girls in grade 8B in 1922, called in this study the Girls Grade Group, we have records of 760 who lived to age 22.0 or later. Of them, 108

had, up till that age, never worked outside the home. They were less successful in school, less intelligent, and less skilful than the 338 for whom we had complete work records to age 22.0. The facts, expressed as divergences from the mean of the group, are as follows:

	<i>Non- workers (n = 108)</i>	<i>Workers (n = 388)</i>	<i>Difference in favor of the worker</i>
Item $\frac{2r+10}{2}$. School advancement	-.33	-.13	.20
Item 12. Scholarship	-.35	-.10	.25
Item $\frac{3+9}{2}$. Intelligence	-.42	-.24	.18
Item 4. Clerical activities	-.10	-.15	-.05
Item 6. Mechanical adroitness	-.15	-.05	.10

In almost all considerations of the relation of women's work outside the home to their status in other respects, it is desirable to know what sorts of girls do and do not so work. In considerations of marriage and fecundity, from the point of view both of eugenics and of education, it is desirable to know what sorts of girls do and do not marry, what sorts marry especially early, and what sorts have the most children. We therefore report facts concerning the abilities at or near age 14.0 of girls who work outside the home and who do not, who are married and who are not, and of girls who have married especially early.

THE COMPARATIVE ABILITIES OF GIRLS WHO DO AND DO NOT
MARRY BEFORE 22.0

Of the 108 girls noted above, the 22 who had not married up to 22.0 averaged somewhat inferior to the 86 who had. The facts, again in deviations from the mean, are given on the following page.

For 254 girls who worked outside the home and had married by the time our records were closed, the abilities averaged about the same as the 86 home girls who had married, and lower than the

working girls who had not married by then. The five values for Items $\frac{2r+10}{2}$, 12, $\frac{3+9}{2}$, 4, and 6 are for them $-.39$, $-.38$, $-.33$, $-.22$, and $-.06$.

		NON-WORKERS		
		<i>Unmarried</i>	<i>Married</i>	<i>Difference</i>
		<i>(n=22)</i>	<i>(n=86)</i>	<i>in favor of</i>
				<i>the married</i>
Item	$\frac{2r+10}{2}$. School advancement	$-.39$	$-.33$	$.06$
Item	12. Scholarship	$-.22$	$-.39$	$-.17$
Item	$\frac{3+9}{2}$. Intelligence	$-.51$	$-.38$	$.13$
Item	4. Clerical activities	$-.32$	$-.05$	$.27$
Item	6. Mechanical adroitness	$-.36$	$-.10$	$.26$

THE COMPARATIVE ABILITIES OF GIRLS WHO WORK ONLY BEFORE
MARRIAGE AND OF GIRLS WHO WORK BOTH
BEFORE AND AFTER MARRIAGE

Of the 254 noted above, the 85 who worked after marriage were superior to those who did not. The facts, in divergences from the mean, are:

		<i>Working</i>	<i>Working</i>	
		<i>only before</i>	<i>both before</i>	<i>Difference</i>
		<i>marriage</i>	<i>and after</i>	<i>in favor</i>
		<i>(n=169)</i>	<i>marriage</i>	<i>of the</i>
			<i>(n=85)</i>	<i>latter</i>
Item	$\frac{2r+10}{2}$. School advancement	$-.52$	$-.14$	$.38$
Item	12. Scholarship	$-.52$	$-.10$	$.42$
Item	$\frac{3+9}{2}$. Intelligence	$-.46$	$-.08$	$.38$
Item	4. Clerical activities	$-.22$	$-.20$	$.02$
Item	6. Mechanical adroitness	$-.11$	$+.05$	$.16$

THE COMPARATIVE ABILITIES OF GIRLS WHO MARRY BEFORE 20.0
AND GIRLS WHO MARRY AFTER 20.0

What little difference there is favors the 117 girls who married before 20.0. The facts are:

	<i>Married before 20 (n = 117)</i>	<i>Married after 20 (n = 223)</i>
Item $\frac{2r+10}{2}$. School advancement	-.36	-.41
Item 12. Scholarship	-.31	-.33
Item $\frac{3+9}{2}$. Intelligence	-.22	-.40
Item 4. Clerical activities	-.07	-.24
Item 6. Mechanical adroitness	-.16	+.00

Five or ten years from now, when marriages from the college and teachers training school groups are included, the difference will probably be obliterated and may swing to the other side, since these groups are notably superior. Even then, however, the early marriages will be of girls very little below the others in success in school, intelligence, or skill.

VIII

SOME ERRONEOUS IDEAS AND PRACTICES CONCERNING EMPLOYMENT

THE ECONOMIC VALUE OF EDUCATION

IT has been customary to use as an argument for extended education the fact that persons who have reached a higher level of education than the average (say a college degree, or high school graduation) soon catch up in earning power with those who left school earlier and eventually surpass them. "Stay in school longer and you will profit financially" has been the text of many appeals to youth. This argument is faulty in two respects. First, it neglects the fact that those who reach higher levels may be those of superior original ability and that their greater income may be a consequence of their original ability rather than of their added education. Second, it neglects the fact that staying on in school longer does not necessarily imply reaching a correspondingly higher educational level. If, for example, the pupils who now leave school at the end of grade 8 remained for four years more, they would not necessarily (or actually) attain graduation from high school to the extent that those who now remain do.

To determine the value of more years of schooling we must compare groups equal in ability at the start, and must not confuse amount of schooling with grade reached, or other measures of the educational level attained.

Our records permit us to make the determination exactly for earnings up to age 22.0. We hope by following these young people on to 32, to settle the question.

The correlation between earnings at age 20.0 to 22.0 (Item 22) and years of schooling measured by the age of leaving school (Item

16) for individuals at work from 18.0 to 22.0, and who scored alike in intelligence (Item 3) (expressed by the formula $r_{22\ 16.3}$), is as follows for each of the four groups: Boys Age, $-.12$; Boys Grade, $-.13$; Girls Age, $.10$; Girls Grade, $-.06$.

The weighted average correlation for boys is $-.13$; for girls, $-.03$. A year more of schooling in place of a year at work (or occasionally idle) for those of equal intelligence scores thus produces a loss in annual earnings at age 20.0 to 22.0. What will be the facts at age 30 to 32 we hope to determine from future records. But surely the assumption that if all boys stayed in school till 21, they would earn as much at 31 as do the specially able boys who now graduate from college at 21, is indefensible and mischievous.

THE INFLUENCE OF LENGTH OF EXPERIENCE UPON EARNINGS

The facts stated above, when viewed from another angle, give a measure of the financial value of length of experience at work. For children of equal intelligence it is nearly counterbalanced, at age 21, by the value of the schooling which replaced it. This does not imply that experience and schooling are both of great financial value, and that either is the substitute for the other. It may, and probably does, mean that neither is of much financial value.

CHANGES OF EMPLOYER

It is a common opinion that the young worker changes rapidly from employer to employer, being unsatisfactory to many and being himself dissatisfied with many. The facts for those in our groups for whom we have complete work records are as shown in Table 47.¹

Among the boys and girls for whom we have full reports from 18.0 to 20.0, 32.8 per cent worked for only one employer during that entire time, 22.6 per cent made one change, and 16.2 per cent

¹ The frequencies per year would be a trifle greater if allowance were made for the persons who were not at work or seeking work for the entire period, as noted in Chapter III, pages 26 ff.

TABLE 47

Number of changes of employer. Distribution and percentage distribution for boys and girls of all groups for whom complete records are available

a) IN 2 YEARS 18.0 TO 20.0

NUMBER OF CHANGES	BOYS AGE		BOYS GRADE		GIRLS AGE		GIRLS GRADE		ALL	
	n	%	n	%	n	%	n	%	n	%
0	56	35.2	190	39.6	62	56.3	210	55.0	518	45.8
1	41	25.8	127	26.5	30	27.3	104	27.2	302	26.7
2	35	22.0	84	17.5	10	9.1	46	12.0	175	15.5
3	9	5.6	39	8.1	8	7.3	14	3.7	70	6.2
4	6	3.8	19	4.0			5	1.3	30	2.6
5	3	1.9	15	3.1			2	.5	20	1.8
6	4	2.5	3	.6			1	.3	8	.7
7	2	1.3	2	.4					4	.3
8	1	.6	1	.2					2	.2
9	2	1.3							2	.2
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
<i>Total</i>	<i>159</i>	<i>100.0</i>	<i>480</i>	<i>100.0</i>	<i>110</i>	<i>100.0</i>	<i>382</i>	<i>100.0</i>	<i>1,131</i>	<i>100.0</i>

made two changes. Thus, only one in nine made more than one change per year. Moreover, some of the cases of frequent change do not represent an essential inconstancy, but work which is by its nature of short term. Changes are more frequent at age 18.0 to 20.0 than at age 20.0 to 22.0, and more frequent for boys than for girls. Nearly three-fourths of the latter made no change or only one change in four years.

TABLE 47 (continued)
b) IN 2 YEARS 20.0 TO 22.0

NUMBER OF CHANGES	BOYS AGE		BOYS GRADE		GIRLS AGE		GIRLS GRADE		ALL	
	n	%	n	%	n	%	n	%	n	%
0	64	40.5	254	51.4	70	70.0	262	67.5	650	57.0
1	34	21.5	115	23.3	19	19.0	73	18.8	241	21.1
2	25	15.8	67	13.6	6	6.0	31	8.0	129	11.3
3	19	12.0	23	4.7	2	2.0	11	2.8	55	4.8
4	7	4.4	13	2.6	2	2.0	4	1.1	26	2.3
5	4	2.5	14	2.8	1	1.0	2	.5	21	1.9
6	1	.7	2	.4			2	.5	5	.4
7	3	1.9	1	.2			2	.5	6	.5
8	1	.7	2	.4					3	.3
9			2	.4					2	.2
10							1	.3	1	.1
11										
12										
13			1	.2					1	.1
14										
15										
16										
17										
18										
19										
20										
<i>Total</i>	<i>158</i>	<i>100.0</i>	<i>494</i>	<i>100.0</i>	<i>100</i>	<i>100.0</i>	<i>388</i>	<i>100.0</i>	<i>1,140</i>	<i>100.0</i>

The extraordinary constancy shown by these records would probably be decreased if the workers of whom we lost track could be included. They were probably much less stable. But a liberal allowance for this would still leave nearly half of the young workers of New York with one change or no change of employer per year.

The turnover has apparently been exaggerated in the minds of students of personnel, perhaps because the individuals who make frequent changes are the ones whom personnel managers and vocational counselors encounter often.

TABLE 47 (continued)

c) IN 4 YEARS 18.0 TO 22.0

NUMBER OF CHANGES	BOYS AGE		BOYS GRADE		GIRLS AGE		GIRLS GRADE		ALL	
	n	%	n	%	n	%	n	%	n	%
0	34	21.7	125	26.1	42	42.9	165	43.2	366	32.8
1	25	15.9	107	22.3	26	26.5	95	24.8	253	22.6
2	25	15.9	84	17.5	14	14.3	58	15.2	181	16.2
3	26	16.6	54	11.3	8	8.2	27	7.0	115	10.3
4	17	10.8	44	9.2	5	5.1	11	2.9	77	6.9
5	6	3.8	18	3.7	1	1.0	13	3.4	38	3.4
6	7	4.5	19	4.0			5	1.3	31	2.8
7	4	2.5	3	.6	1	1.0	2	.5	10	.9
8	3	1.9	8	1.7	1	1.0	3	.8	15	1.3
9	2	1.3	6	1.3			1	.3	9	.8
10	2	1.3	6	1.3			1	.3	9	.8
11	2	1.3	1	.2					3	.3
12	1	.6	1	.2			1	.3	3	.3
13										
14	2	1.3	1	.2					3	.3
15										
16	1	.6	1	.2					2	.2
17										
18										
19										
20			1	.2					1	.1
Total	157	100.0	479	100.0	98	100.0	382	100.0	1,116	100.0

The picture our records show is just the reverse of the picture of restless youth trying one job after another and being satisfied at none. If these young people err, it is by being inert and too easily satisfied. If their employers err, it is by retaining workers whom they might supplant by better ones.

EARNINGS AT CLERICAL AND AT MECHANICAL WORK

It is a common opinion that clerical or office work is less well remunerated than mechanical or factory work in the sense that the

same individual, at least if he is an ordinary individual, will receive less at the former than the latter. The "white-collar" worker is supposed to sacrifice money to obtain other goods such as lighter work, social prestige, and pleasanter surroundings.

The evidence given to support the opinion is the wage scales in certain employments. But obviously the annual income depends also upon the percentage of working time. What is required to decide the truth or falsity of the opinion is a record of earnings per annum of a representative group of persons who have worked at both sorts of work, or a record of the earnings per annum of two groups, one containing persons doing mechanical work, the other containing persons doing clerical work, the groups being alike in other respects.

As a byproduct of an investigation of the careers of approximately two thousand boys and girls from 1922 to 1932,² and from about age 14.0 to age 22.0 or later, we have records approximating what is required. They do not show that clerical work entails a financial sacrifice of any consequence, in the case of young men and women aged 20.0 to 22.0 at work in New York City from 1927 to 1931.

Our records include some boys and girls who worked at two or more jobs, one or more of which was mechanical and one or more of which was clerical, during the two years from age 20.0 to age 22.0. We allocate idle periods equally to the kind of work immediately following and immediately preceding the period of idleness. We then compute what their earnings per year would have been at each sort of work. The balance is about \$50 per year in favor of mechanical work in the case of the boys and about \$25 in the case of the girls.³

Our records include much larger numbers of boys and girls who worked exclusively (or almost so) at mechanical work or at clerical work. The annual earnings of the clerical workers were about the same as those of the mechanical workers in the case of the boys and

² See Appendix II, page 130.

³ Not much weight should be attached to these figures, because the necessity of allocating time out of work by guess may introduce a considerable error, and because the populations are very small.

TABLE 48

Average annual earnings at age 20.0 to 22.0 (Item 22) of those in Age and Grade Groups engaged chiefly in mechanical or clerical work; also mean scores in Items 3, 9, 5 (or 6), 2a (or 2r), and 12

	<i>Items</i>					
	22	3	9	5, 6	2a, 2r	12
<i>Boys Age Group</i>						
M workers (n=70)	\$1,260	23.72	71.95	47.56	12.00	33.33
C workers (n=33)	1,446	35.68	76.30	33.36	14.32	37.50
Superiority of C workers	186	11.96	4.35	-14.20	2.32	4.17
<i>Boys Grade Group</i>						
M workers (n=140)	1,513	37.14	74.54	45.81	-47.46	39.51
C workers (n=190)	1,444	42.59	79.00	34.07	-42.86	42.30
Superiority of C workers	-69	5.45	4.46	-11.74	4.60	2.79
<i>Girls Age Group</i>						
M workers (n=34)	953	27.18	60.74	32.94	12.79	36.91
C workers (n=48)	1,287	42.58	77.60	48.25	15.31	41.87
Superiority of C workers	334	15.40	16.86	15.31	2.52	4.96
<i>Girls Grade Group</i>						
M workers (n=121)	1,024	33.60	62.58	46.63	-46.36	40.28
C workers (n=199)	1,215	41.36	74.06	45.70	-42.02	43.32
Superiority of C workers	191	7.76	11.48	-0.93	4.34	3.04

NOTE: See pages xxii ff. for definitions of the items.

clearly higher (about 20 per cent) in the case of the girls, as shown in Table 48. But those doing clerical work were superior in ability; at least, they were superior at the time of the tests at or near age 14.0; they had advanced farther in school, obtained higher marks, and made better scores in tests of intelligence. In our tests of mechanical ability the boys doing clerical work were inferior to those doing mechanical work, but the clerical girls were superior to the mechanical even in mechanical ability.

It is possible to determine from the correlations of these traits with earnings the differences that would have been found in average earnings from age 20.0 to 22.0 in the case of boys (or girls) alike

in any of these traits. For example, the probable earnings at clerical work of clerical workers having the same score in Item 3 (clerical intelligence) as the average for mechanical workers in the same group are as follows:

Boys Age	\$1,349 or superior by \$89 to earnings at M work
Boys Grade	\$1,402 or inferior by \$111 to earnings at M work
Girls Age	\$1,145 or superior by \$192 to earnings at M work
Girls Grade	\$1,160 or superior by \$136 to earnings at M work

The probable earnings at mechanical work of mechanical workers having the same score in Item 3 as the average for clerical workers in the same group are as follows:

Boys Age	\$1,280 or inferior by \$166 to earnings at C work
Boys Grade	\$1,524 or superior by \$80 to earnings at C work
Girls Age	\$977 or inferior by \$310 to earnings at C work
Girls Grade	\$1,035 or inferior by \$180 to earnings at C work

It is possible to determine the probable earnings at clerical work of clerical workers having the average score of the mechanical workers in all the tests, and the probable earnings at mechanical work of a mechanical worker having the average score of the clerical workers in all the tests. But this is a much more elaborate task, and one requiring knowledge of all the intercorrelations of all the traits in question and very lengthy computations. It does not seem desirable to spend the time, since a very close approximation to the result can be obtained by using the clerical intelligence test score (Item 3) alone for clerical work, its correlations with earnings at age 20.0 to 22.0 being within 2 points as high as those from the best multiple correlation with school progress, clerical intelligence and activity, mechanical ability, and abstract intelligence (Items 2, 3, 4, 5 or 6, and 9)⁴ and by using Item 9 alone for girls, for mechanical work.⁵

⁴ See Table 36.

⁵ In the case of Girls Grade girls doing mechanical work, Item 9 alone gives .21; Items 9+6 give .25 (.249); Items 9+6+4 give .25 (.254); Items 9+6+4+3 give 0.00.

For mechanical work in the case of boys, the best multiple equation will hardly give a correlation of .10 and will give heavy weight to Item 5, in which the mechanical workers were far superior to the clerical workers.⁶ Consequently, it is certain that the average earnings of all the mechanical workers will not differ by more than a small amount from the probable earnings of those whose ability by the combination of test scores of the best multiple regression equation equals that of the average clerical workers. The latter will probably be the lower of the two.

For clerical work, then, we use the figures given above with an allowance for the two point rise of the best multiple over the test score in abstract intelligence (Item 9), with the following results.

Boys and girls engaged in clerical work at age 20.0 to 22.0. Boys in the Boys Age Group earned \$186 more per year than those engaged in mechanical work, of which approximately \$106 is due to their superiority in intelligence, scholarship, etc. Boys in the Boys Grade Group earned \$69 less per year, and would have earned about \$115 less except for their superiority. Girls in the Girls Age Group earned \$334 more per year, of which approximately \$156 is due to their superiority. Girls in the Girls Grade Group earned \$191 more per year, of which \$64 is due to their superiority. We have then balances of \$80, -\$115, \$178, and \$127. Weighted in proportion to the numbers in the groups, the weighted balance for boys is -\$84, and +\$137 for girls.

Girls engaged in mechanical work at age 20.0 to 22.0 (using the abstract intelligence test plus an allowance of .04 for the influence of its improvement by other tests). Girls in the Age Group earned \$334 per year less than girls in the same group engaged in clerical work, of which approximately \$54 is due to their inferiority in the traits correlated with earnings at mechanical work. Girls in the Grade Group earned \$191 per year less than girls in the same group engaged in clerical work, of which approximately \$70 is due to their inferiority in the traits referred to above.

⁶ We assume that the same sort of regression equation is to be used for both the Boys Age Group and the Boys Grade Group, due weight being given to the size of the groups in determining it.

TABLE 49

Average annual earnings at age 18.0 to 20.0 (Item 30) and at age 20.0 to 22.0 (Item 22) of those in Age and Grade Groups engaged chiefly in mechanical or clerical work. The number of workers in each group is given in parentheses after the figure for earnings

	<i>Item 30</i>	<i>Item 22</i>	<i>Change</i>
<i>Boys Age Group</i>			
M workers	\$1,079 (70)	\$1,260 (70)	\$181
C workers	1,118 (34)	1,446 (33)	328
Superiority of C workers	39	186	147
<i>Boys Grade Group</i>			
M workers	1,248 (139)	1,513 (140)	265
C workers	1,151 (181)	1,444 (190)	293
Superiority of C workers	-97	-69	28
<i>Girls Age Group</i>			
M workers	872 (31)	953 (34)	81
C workers	1,117 (48)	1,287 (48)	170
Superiority of C workers	245	334	89
<i>Girls Grade Group</i>			
M workers	946 (121)	1,024 (121)	78
C workers	1,040 (194)	1,215 (199)	175
Superiority of C workers	94	191	97

We have then balances of \$280 and \$121, or, when weighted, + \$166.

Boys engaged in mechanical work at age 20.0 to 22.0. Boys in the Boys Age Group earned \$186 less per year than those engaged in clerical work and those in the Boys Grade Group \$69 more. The weighted average difference is \$16 less. The best multiple regression equation would alter it little, perhaps to \$20 less, for boys equal in its components of abilities to the average clerical worker.⁷

⁷ If we use the mechanical test (Item 5) alone we have the following results. The boys in the Boys Age Group having the same ability in test 5 as the average clerical worker in the Boys Age Group, earned \$159 less than the latter. The boys in the Boys Grade Group having the same ability in test 5 as the average clerical worker in the Boys Grade Group, earned \$22 more than the latter. The weighted average balance is then \$38 in favor of clerical work.

An ordinary boy at age 20.0 to 22.0 may then expect a loss of about 2 per cent for engaging in clerical rather than mechanical work, but an ordinary girl may expect a gain of about 15 per cent.

If advancement in earnings at age 22.0 to 24.0 follows the course it took from earlier years to the period 20.0 to 22.0, clerical work will have the advantage over mechanical work, even for boys, and will increase its advantage for girls. The superiorities at age 20.0 to 22.0 (\$186, —\$69, \$334, and \$191) were much more than at age 18.0 to 20.0 (\$39, —\$97, \$245, and \$94) as shown in Table 49. Advancement was much more rapid for the clerical workers.

As we have noted elsewhere, the only class of persons that makes any large financial gain by choosing mechanical work is the very dull, especially the very dull boys.

PARENTAL STATUS AND VOCATIONAL SUCCESS

Opinions differ widely concerning the influence of family status upon vocational success. The majority would attach large weight to it. Apart from its intrinsic and general importance, the matter concerns us because in so far as parental influence obtained jobs, or promotions, or both, irrespective of the real abilities and work of the candidates, all correlations with test scores and school records as of age 14.0 (Items 2 to 15) would be diluted—"attenuated," as the statisticians say—by this irrelevant factor.

We secured a rough measure of the social and financial status of the family from the school's records of the father's occupation. From ratings by five persons more or less expert we assign to all save ambiguous occupations (such as "works in a bank" or "antiques") a rating from 2 (for the lowest forms of unskilled labor) to 18 for a rabbi, lawyer, physician, and the like.

We correlated these ratings with various items in the case of mechanical and clerical workers in the Boys Grade Group, with the results shown in Table 50. Boys whose fathers were in the more esteemed and more remunerative occupations do not earn any more

TABLE 50

Correlations of the ratings of the father's occupation with various items of vocational history, educational history, and test scores at age 14.0 for those in Boys Grade and Girls Grade Groups engaged chiefly in clerical or mechanical work

	<i>Items</i>										
	22	23	24	30	16	18	2	12	3	5, 6	9
<i>Boys Grade Group</i>											
M workers (n=131)	.00	-.06	.01	-.01			.12	.09	.10	.14	.12
C workers (n=182)	-.03	.04	.08	.00			.02	.13	.03	.10	.04
<i>Girls Grade Group</i>											
C workers (n=188)	-.02	.23	.06	-.09	.07	.10	.04	.10	.04	.01	.04

NOTE: See pages xxii ff. for definitions of the items.

at 18.0 to 22.0 than boys from lower social strata, or have jobs of higher level, though they scored higher in tests of intelligence and mechanical adroitness, made faster progress in school, and attained higher marks in scholarship. They left school at later ages, and presumably when the handicap of less experience has been removed and the college groups added, the correlations will rise somewhat.

But it is obvious that, in our groups, there is no "attenuation" of predictive values by the influence of parental status. It amounted to very little in securing their jobs and promotions. The father can give his son ability by heredity, and longer schooling by wealth or sacrifice, but the sons of unskilled day laborers compete in the industrial market nearly or quite on a level with the sons of merchants, professional men, and the like. Probably in New York City employers do not know the parents of three employees in a hundred. In a smaller community, where life in all aspects is more personal, the facts may be different.

The whole matter requires much longer study and over a wider area, but our results suggest that the notion that parental influence is a very large factor in the vocational success of young people in large cities is likely to be erroneous.

FREE COMPETITION IN THE SELECTION AND
PROMOTION OF EMPLOYEES

Probably not even the most devoted adherents to the classical economics would insist that employees got their jobs by seeking the highest bidder for their services, but some could probably be found who would insist that employers did select and promote with an eye single to the success of their business. In Chapter VI we presented evidence to the contrary. We shall now present facts which seem to prove that some employers are moved by sheer custom, almost by superstition. These facts concern the relation of bodily size at 14.0 to earnings at age 18.0 to 22.0.

The size which a boy or girl has attained at age 14.0 is of some significance as an indicator of eventual size. It is also of some significance as a symptom of the degree of physiological and mental maturity reached. Counselors advising children of that age would probably consider the size then attained as of almost or quite no value in predicting success at clerical work, but as of some value for some trades and "mechanical" occupations.

We obtained the school's measures of height and weight at the time of the tests where we could, and transposed each into the most probable height or weight for the individual in question at age 14.0. We then correlated these measures with earnings, level of job, and interest in job at ages 20.0 to 22.0 and 18.0 to 20.0 (Items 22, 23, 24, 30, 31, and 32) in the case of 263 mechanical workers and 311 clerical workers. The results are shown in Table 51.

The correlations with liking for one's work (Items 24 and 32) are approximately zero (averaging .01), as would be expected. The correlations with level (Items 23 and 31) are a little higher; and the correlations with earnings per year (Items 22 and 30) are, in

TABLE 51

Correlations of height and weight at age 14.0 with annual earnings, level of job, and interest in job at age 20.0 to 22.0 and at age 18.0 to 20.0 (Items 22, 23, 24, 30, 31, 32) for those in Boys Grade and Girls Grade Groups engaged chiefly in mechanical or clerical work

	AT AGE 20.0 TO 22.0			AT AGE 18.0 TO 20.0		
	22	23	24	30	31	32
<i>Mechanical workers</i>						
Height						
B.A. (n = 46)	.33	.06	.21	.19	.15	.14
B.G. (n = 129)	.04	.01	-.13	-.02	-.01	-.19
G.A. (n = 21)	.20	-.17	.19	.19	-.02	.05
G.G. (n = 67)	.08	-.06	.11	.23	.02	.00
Average	.16	-.04	.10	.15	.04	.00
Weighted average	.11	-.01	.01	.10	.02	-.07
Weight						
B.A. (n = 46)	.39	.20	.21	.26	.15	.16
B.G. (n = 129)	.10	.00	-.11	.03	.02	.01
G.A. (n = 21)	-.35	.07	.11	-.07	.34	.18
G.G. (n = 67)	.11	-.01	.13	.11	-.05	.04
Average	.06	.07	.09	.08	.12	.10
Weighted average	.11	.04	.02	.08	.05	.06
<i>Clerical workers</i>						
Height						
B.A. (n = 20)	.02	.10	-.14	.11	.05	.05
B.G. (n = 153)	.24	.12	.02	.29	.17	.07
G.A. (n = 31)	.03	-.25	-.22	.10	-.20	-.20
G.G. (n = 107)	.13	.15	.00	.25	.20	.12
Average	.11	.03	-.09	.19	.06	.01
Weighted average	.17	.09	-.02	.25	.14	.06
Weight						
B.A. (n = 20)	.14	.18	-.41	.19	.26	-.26
B.G. (n = 153)	.23	.04	.02	.27	.09	.10
G.A. (n = 31)	.05	-.10	-.03	.12	-.19	.08
G.G. (n = 107)	.07	.09	-.12	.15	.05	-.01
Average	.12	.05	-.14	.18	.05	-.02
Weighted average	.15	.04	-.06	.21	.06	.04

TABLE 52

Correlations of height and weight at age 14.0 with school progress (Item 2a or 2r), clerical intelligence (Item 3), abstract intelligence (Item 9), and mechanical ability (Item 5 or 6) at age 14.0 for those in Age and Grade Groups engaged chiefly in mechanical or clerical work

	<i>Item 2a, 2r</i>	<i>Item 3</i>	<i>Item 5, 6</i>	<i>Item 9</i>
<i>Mechanical workers</i>				
Height				
B.A. (n=46)	.15	.08	.14	.10
B.G. (n=129)	.21	.16	.08	.17
G.A. (n=21)	.45	.18	.15	.33
G.G. (n=67)	.17	.32	-.14	.42
Average	.25	.19	.06	.26
Weighted average	.21	.19	.04	.23
Weight				
B.A. (n=46)	-.04	-.02	.12	.05
B.G. (n=129)	.27	.28	.18	.25
G.A. (n=21)	.48	.03	.32	.33
G.G. (n=67)	.22	.13	.04	.27
Average	.24	.11	.17	.23
Weighted average	.22	.17	.15	.23
<i>Clerical workers</i>				
Height				
B.A. (n=20)	.11	.15	.61	.29
B.G. (n=153)	.25	.20	.03	.30
G.A. (n=31)	.05	.12	.10	.18
G.G. (n=107)	.28	.28	.13	.12
Average	.17	.19	.22	.22
Weighted average	.23	.22	.11	.22
Weight				
B.A. (n=20)	-.10	-.03	.40	-.09
B.G. (n=153)	.23	.17	.02	.26
G.A. (n=31)	.10	-.04	-.11	-.08
G.G. (n=107)	.19	.14	.13	.20
Average	.11	.06	.11	.07
Weighted average	.18	.13	.07	.18

general, as high as the highest obtained for rate of progress in school, scholarship, intelligence, and mechanical adroitness.

Contrary to what the practice of counselors would suggest, the correlations with earnings are higher for clerical than for mechanical work (.16 versus .11 at age 20.0 to 22.0, and .23 versus .09 at age 18.0 to 20.0). Contrary to what we found for qualities predictive of real ability, such as Items 3, 5, 9, and 12, the correlations are higher with earnings at age 18.0 to 20.0 than with earnings at age 20.0 to 22.0. It is probable, consequently, that the correlations are due not only to the fact that size at age 14.0 is a symptom, directly or indirectly, of qualities useful in a worker, but also to the fact that employers pay for size regardless of utility. This interpretation is supported by the facts concerning the correlations of size at age 14.0 with useful qualities, and the "partial" correlations of size with earnings when these are equalized. The correlations of height and weight at age 14.0 with advancement in school, clerical intelligence, mechanical adroitness, and abstract intelligence (Items 2a or 2r, 3, 5, and 9) are as shown in Table 52. The correlations of height and weight at 14.0 with earnings at 20.0 to 22.0 (Item 22) and at 18.0 to 20.0 (Item 30) for workers having identical scores in Item 9 are shown in Table 53. We have not computed the partial correlations with Item 2 or 3 or 5 equalized, or for the Age Groups. The results for the Age Groups will differ little from those for the Grade Groups; and equalizing for Items 2, 3, and 5 as well as for Item 9 will still leave the greater part of the correlations between height and weight at 14.0 and earnings at 18.0 to 22.0. Equalizing for Item 9 causes a reduction from .08 to .06, .06 to .05, .18 to .15, and .25 to .23. Equalizing for Items 2, 3, and 5 also will probably not bring them below .05, .04, .12, and .20.

Regardless of his intellectual abilities, a child who is big for his age at 14.0 is paid considerably more, especially at clerical work, than the average. It may possibly be that size is a symptom of valuable moral or temperamental qualities not measured by us, but we probably have here an illustration of the unreasonableness of employers.

TABLE 53

Correlations of height and weight at age 14.0 with annual earnings at age 20.0 to 22.0 (Item 22) and at age 18.0 to 20.0 (Item 30) for those in the Boys Grade and Girls Grade Groups having identical scores in abstract intelligence test (Item 9)

	<i>Item 22</i>	<i>Item 30</i>
<i>Mechanical workers</i>		
Height		
Boys Grade (n=129)	.04	— .02
Girls Grade (n=67)	— .01	.18
Weight		
Boys Grade (n=129)	.10	.04
Girls Grade (n=67)	.06	.06
Weighted average	.06	.05
<i>Clerical workers</i>		
Height		
Boys Grade (n=153)	.21	.28
Girls Grade (n=107)	.11	.23
Weight		
Boys Grade (n=153)	.20	.25
Girls Grade (n=107)	.03	.11
Weighted average	.15	.23

IX

SUMMARY OF RESULTS IMPORTANT FOR THE THEORY AND PRACTICE OF VOCATIONAL GUIDANCE

AT the time of the tests, in 1922, we had, for the children studied, a complete school record and test scores in general intelligence, clerical capacity, and mechanical adroitness. The children studied included all degrees of ability except the very lowest who are excluded from schools.

The values of certain items of the school record and test scores for educational prediction and guidance are very great. The grade reached at age 14.0 or 15.0 or 16.0, taken together with the age to which the family plans to keep the boy or girl in school, will predict the grade which the individual will reach at any age with substantial accuracy (a correlation of .90 or higher).

Indirectly, this educational prediction is of vocational significance as well. If an occupation is open only to graduates of higher institutions of learning, such as colleges or professional schools, it may be predicted with very high probability that certain pupils cannot succeed in that occupation, for the very good reason that they cannot even enter it. The vocational counselor may safely assume that a pupil whose expected grade status at age 22.5 (schooling being continuous from the time of the test on) is below grade 14 (college sophomore or second-year student in a professional school entered after high-school graduation), can never graduate from a reputable college, law school, medical school, theological school, professional school for teachers, collegiate school of business or journalism, engineering school, or the like. The same holds substantially for expectation below grade 13 at age 21.5, or below grade 12 at age 20.0.

If the individual has had atypical educational opportunities so that the grade reached at age 14.0 or 15.0 or 16.0 is not a trust-

worthy measure of his ability to succeed in school in early years, his intelligence test score may be used in place of his age-grade status for educational predictions, and for vocational predictions where entrance to the vocation depends upon attaining a certain educational level.

The item of grade reached at a given age should be considered whenever a child's further education, or anything depending upon that, is considered. It can be obtained and recorded in a few seconds, and checked by a letter or telephone call to the school. In general, grade reached, scholarship marks, intelligence test score, or any combination of these, predicts success in school after age 14.0 fairly well.

The value of the items of school record and test scores in predicting vocational success is different according as clerical or office work and mechanical or manual work is in question.

In the case of those persons who worked nine-tenths or more of the time from age 18.0 to age 22.0 at clerical work, the correlations range from .00 to .26. The most significant item is the test score in clerical intelligence (Item 3) which has average correlations of .26 with earnings at age 20.0 to 22.0, .19 with earnings at age 18.0 to 20.0, .10 with liking for job at age 20.0 to 22.0, and .05 with liking at age 18.0 to 20.0. A difference of one standard deviation or a sixth of the range in test score in the clerical intelligence test means a probable difference of nearly \$120 per year in earnings for a boy and of over \$110 per year for a girl.

The next most significant item is the test score in clerical activities (Item 4), with correlations of .22, .14, .08, and .04, respectively. School progress or grade reached at a given age, general intelligence, average scholarship mark, and mechanical adroitness are somewhat less significant. School conduct marks and school attendance have no predictive value. The highest correlation obtainable by combining the information of the school record and tests will not produce a correlation (with earnings at age 20.0 to 22.0) over .30 for the boys or over .40 for the girls. The correlation for earnings at age 18.0 to 20.0 will be lower. The correlations with level of job are lower, and those with interest in the work are still lower.

The correlations which school progress, grade reached, and average scholarship mark show with success at clerical work are almost entirely (perhaps entirely) due to the fact that intelligence is a factor in both school success and success at clerical work. The correlation obtainable from combining Items 3, 4, and 5 or 6 (scores in the tests of clerical intelligence, clerical activities, and mechanical adroitness) is not improved appreciably by including also Items 2, 10, and 12 (grade reached, school progress up to age 14.0, and scholarship mark). Indeed, Item 3 alone is nearly as good as any combination.

Item 3, or the score obtained in the test of very similar nature devised by Dr. O'Rourke, or some other similar test, is then, so far as present knowledge goes, the best convenient means of predicting success as a clerical worker. Its prophetic value is not great. It may correlate as high as .60 with the future possession of the abilities required by clerical work; but concerning what the person will actually earn, what the level of his job will be, and how much he will enjoy the work, its prophecies are only about .26, .21, and .10.

In the case of those persons who worked nine-tenths of the time from age 18.0 to 22.0 at mechanical or manual work, the items of school record and test scores show correlations from .00 to .14. All are then nearly valueless, alone or in combination, as means of forecasting success at mechanical work. Much the same is found in the case of the 305 individuals who worked at jobs requiring a mixture of clerical and mechanical work, or who shifted from one sort of job to the other. Mechanical adroitness and general intelligence are the best indicators; but no combination of the facts at age 14.0 would enable a vocational counselor to foretell much better than he could by a sheer guess how much a boy or girl will earn at mechanical work six or eight years later or how happy he will be at it. High marks for conduct in school and regularity of attendance have zero value as they did for success at clerical work.

In the case of clerical workers, there is evidence that the predictive value of the tests and school record may become greater at later ages than at age 22.0. It is appreciably greater at age 20.0 to

22.0 than at age 18.0 to 20.0. In the case of mechanical workers and others, there is no evidence of this.

If there were perfectly free and rational competition among workers and among employers, so that the former obtained jobs exactly in proportion to the value of their services and the latter obtained quality in employees exactly in proportion to the wages they offered, the correlations of test scores and school record with wages, level, and interest might conceivably be double what we find. Even if this happened, school conduct and school attendance would still be of no value; and none of the facts would have more than slight significance for success at mechanical work.

The higher a pupil's scores are in tests of clerical intelligence, clerical activities, general intelligence, school progress, and scholarship, the more his success at clerical work will surpass his success at mechanical work. Conversely, the lower his scores are in these items, the more advisable it is for him to choose mechanical work. But the differences are not great. A bright and scholarly boy or girl who, because of interest or some special opportunity, wishes to learn a trade or work in a factory, may do so at no great disadvantage to himself. The same is true of dull children unsuccessful in school, who for any good reason are specially desirous of undertaking office work.

There have been three other investigations which have recorded facts about children and then followed their vocational careers. Woolley,¹ following children to age 17, found much lower correlations than ours. The London inquiry² found, at dates of from two years and a half to four years after the tests, congruities with the employers' estimates of the satisfactoriness of the workers which are about the same in amount as our correlations with earnings. They found congruities with the workers' estimates of the satisfactoriness of the jobs which are about the same as our correlations with interest. The Birmingham inquiry³ obtained, two years after the tests, much

¹ See pages 76 f.

² See pages 78 ff.

³ See pages 81 ff.

higher congruities, but there are grounds for supposing that the statements of employers and employees were influenced by the fact that the juvenile employment office had or had not recommended the child to the employer or the job to the child.

Of New York City boys in grade 8, nearly a tenth go to a regular day college for at least one semester and another tenth complete at least one semester of collegiate education in evening classes. The former, especially those going to colleges of high rank, are clearly an élite in intellect and scholarship. The latter are less so, though still much above the general average. Of New York City girls in grade 8, about 7 per cent go to a regular day college or a training school for teachers, and about 2.5 per cent more to evening college classes. The selection for intellect and scholarship is even more stringent than among the boys.

One or two children in a hundred from our group became criminals or loafers. These were inferior at age 14.0 in all respects. Here for the first time we find significance in the school records of conduct and attendance.

Working girls were somewhat abler in school and in tests than girls who never worked. Married non-workers were somewhat abler than unmarried non-workers. Working girls who do not marry before age 22.0 were somewhat abler than those who do. Working girls who continue work after marriage (up to age 22.0) are abler than those who do not.

Infrequency of change of employer cannot be trusted as evidence of vocational success. Its correlations with earnings, level of job, and liking for job were only .15, .08, and .09 at age 20.0 to 22.0; and only .11, .04, and .09 at age 18.0 to 20.0. Those who change their employers oftenest earn almost as much and like their work about as much as those who remain with the same employer through the entire four years.

Our records enable us to tell what financial loss, if any, a boy or girl suffers who does "white-collar" work rather than factory or trade work. Contrary to a common opinion, the annual earnings are actu-

ally greater for the white-collar workers in our groups. But they are abler; at least they were at age 14.0. Correcting for this, we find that at age 20.0 to 22.0, a boy may expect a loss of about 2 per cent, and that a girl may expect a gain of about 15 per cent from choosing clerical rather than mechanical work. If the rises in earnings during the age period 22.0 to 24.0 show the same trends as those occurring from 18.0 to 22.0, clerical work will then be financially superior for boys and will increase its advantage for girls. Apparently the only persons who make any larger financial gain by choosing mechanical work are the very dull, especially the very dull boys.

Parental status had little influence upon vocational success to date, but will probably show more when the influence of beginning work early has faded out and when the college group can be included. The children of clergymen, lawyers, physicians, and the like are more successful in school and in the tests, and stay longer in school than the children of unskilled laborers, but earn no more at age 18.0 to 22.0. They have positions of a little higher level and like their jobs a little better.

There is much indirect evidence that employers do not fit wages to services very accurately in the case of these young workers. Direct evidence also appears in the fact that they pay substantial premiums for mere size in the case of clerical workers! Employers certainly can profit greatly by using tests of intelligence, clerical capacity, and mechanical adroitness in the selection of employees. Even if the correlations for tests at the time of employment should be as low as those for tests at age 14.0, and even if the correlations with services rendered should be as low as those with wages received (they probably will be much higher), test scores will be much better than prejudices and superstitions.

A P P E N D I X

For the meaning of the numbers used to denote the different items of fact known at the time of the tests or discovered later, see pages xxii ff.

APPENDIX I

THE TESTS

THE tests in clerical intelligence, C1, clerical activities, C2, arithmetic, and reading¹ appear in part or in whole on the following pages. The tests in mechanical adroitness (the Stenquist Assembly Test for boys and the I.E.R. Assembly Test for girls) cannot be shown adequately on the printed page. Directions for scoring the former are quoted on page 127; a full description of the test is given in *Measurements of Mechanical Ability*, Teachers College Contributions to Education, No. 130, by J. L. Stenquist.² In the case of the assembly test for girls, directions which the person tested is to read and follow are printed on page 126, and photographs of the parts which she is to put together and the objects which she is thereby to construct, follow page 126.

These tests are all such as any intelligent and careful person can administer. They can be extended to any desirable number of alternative forms. They were devised as suitable measures of ability with ideas, ability with things and mechanisms, and ability with clerical items and procedures, in children from thirteen to sixteen. We shall not repeat or extend the evidence justifying them which were presented in an earlier report,³ since the pages of the present report will appraise their value by suitable and searching criteria. It may, however, be noted that if we were to begin our investigation anew next year, we should use these same tests, or others very similar to them, to measure the three abilities in question.

¹ Items 3, 4, 7, 8, 5, 6 are the scores in these tests. See page xxii for definitions.

² New York: Teachers College, Columbia University, 1923.

³ Herbert A. Toops, *Tests for Vocational Guidance of Children Thirteen to Sixteen*. Contributions to Education, No. 136 (New York: Teachers College, Columbia University, 1923).

The timing and scoring of the tests is described in the report by Toops, and in the instructions furnished to those who use the tests. These are obtainable from C. H. Stoelting, Chicago, or from the Division of Psychology, Institute of Educational Research, Teachers College, Columbia University.

Specimen lines from the test of clerical intelligence (C1) are as follows:

- Test 1. Simple number combinations to be marked right or wrong
 $15 - 4 = 12$ $7 + 13 = 21$ $4 + 13 = 17$
- Test 2. Code learning; substituting letters for figures
Code *w* *o* *r* *k* *i* *n* *g* *d* *a* *y*
 1 2 3 4 5 6 7 8 9 0
Price \$5.63 *Mark*
Price 11.49 *Mark*
- Test 3. Copying numbers of 5, 6, 7, 8, and 9 figures on the back of the sheet containing them
- Test 4. Selecting items from a table under certain restrictions
- Test 5. Vocabulary test: options type response
To cheat is to help wrong trust convey
- Test 6. Vocabulary test: select from 100 given words those having meanings for business, family, war, etc.
- Test 7. Reading words printed backward
owT sulp eerht era? Ans.
- Test 8. Statements about business to be marked true or false
The smallest minted piece of U. S. money is the mill. T F
F. O. B. means Filled on Bill. T F
- Test 9. Selecting numerical items from a table of numbers under certain qualifications
- Test 10. Selecting numbers from a table by means of rows and columns

The test of clerical activities (C2) is more routine than C1. Test 1 is to underscore every A in a page of capital letters; test 2, to underscore every 4 in a page of figures; test 3, to underscore every number containing both a 2 and a 3 in a page of six-figure numbers; test 4, to recognize which pairs of numbers are alike in a page of

4 columns of six-figure number pairs; test 5, to find addresses for given names from a directory.

The arithmetic test is shown in full and the first and last paragraphs of a typical form from the reading test, for which the well-known Thorndike-McCall Reading Scale was used.

ARITHMETIC TEST

Write or print your name here very plainly

.....
 First name Middle name Last name

Find the answers to these problems. Write the answers on the dotted lines. Use the blank sheets to figure on.

*Write the
answers here*

1. What is the cost of four tickets at 50 cents each? Answer
2. What will 4 eight-cent stamps and 1 three-cent stamp cost? Answer
3. What is the cost of 700 articles at 10 cents a hundred? Answer
4. How much will 24 lemons cost at 30 cents a dozen? Answer
5. Which is longer, a year and a half or 15 months? How much longer? Answer
6. John has saved \$4.45. How much more does he need to buy a shirt at \$2.75 and a hat at \$2.25? Answer
7. At 6 for 25c, what is the cost of 3 dozen? Answer
8. If $\frac{3}{4}$ of a gallon of oil costs 9 cents, what will 7 gallons cost? Answer
9. The uniforms for a baseball nine cost \$2.50 each. The shoes cost \$2 a pair. What was the total cost of uniforms and shoes for the nine? Answer
10. What number minus 7 equals 23? Answer
11. What number must you multiply by 8 to get 16 as a product? Answer
12. What part of 16 equals half of 24? Answer

13. 4 percent of \$600 equals 6 percent of what amount? Answer
14. What is the cost of 20 articles at 3 for 5 cents? Answer
15. At what price must tickets be sold to net \$600 from a fair, supposing that the expenses are \$250 and that 1,500 tickets can be sold? Answer
16. A family spends \$600 on rent, \$3,000 on other expenses and saves \$200. If they increase their total expenses to \$4,200 and their savings in the same ratio, how much will they save? Answer
17. How much must a road rise in each 100 feet of length if it rises 60 feet in 2,000 feet of length? Answer
- In problems 18 and 19 find the right numbers to put where the dots are.*
18. Goli is 40c a pound. Kelas are $2\frac{1}{2}$ c each.
3 ounces of Goli cost . . . as much as 1 Kela.
19. Jofas are 4 for 25c. Kelas are $2\frac{1}{2}$ c each.
A Jofa costs as much as a Kela.
20. There are two numbers. The first times the second equals $\frac{1}{10}$. The first divided by the second equals 10. What are the numbers? Answer
21. There are two numbers. Their sum is 9. The larger number equals 2 times the difference between the numbers. What are the numbers? Answer

READING TEST

Read this and then write the answers. Read it again if you need to.

Nell's mother went to the store on Water Street to buy ten pounds of sugar, a dozen eggs and a bag of salt. She paid a dollar in all. Nell and Joe went with her. On the way home on Pine Street, they saw a fire-engine with three horses.

1. What three things did Nell's mother buy?
2. What did she buy besides sugar and salt?

3. Write the name of the street where the fire-engine was seen.
.....
4. Who went to the store with Nell and Joe?
.....

Read this and then write the answers. Read it again if you need to.

THE AMERICAN STATE

He who looks at a map of the Union will be struck by the fact that so many of the boundary lines of the States are straight lines. Those lines tell the same tale as the geometrical plans of cities like St. Petersburg or Washington, where every street runs at the same angle to every other. The States are not areas set off by nature. Their boundaries are for the most part not natural boundaries fixed by mountain ranges, nor even historical boundaries due to a series of events, but boundaries, purely artificial, determined by an authority which carved the national territory into strips of convenient size, as a building company lays out its suburban lots. Of the States subsequent to the original thirteen, California is the only one with a genuine natural frontier, finding it in the chain of the Sierra Nevada on the east and the Pacific Ocean on the west. No one of these later States can be regarded as a naturally developed political organism. They are as trees planted by the forester, not self-grown with the help of the seed-scattering wind.

36. What three sorts of boundary lines are mentioned?
.....
37. What action of a corporation owning land is likened to the action of the government of the United States in setting off the areas of the newer states?
.....
38. To what may we attribute the similarity between the plans of certain cities and the arrangement of the States?
.....
39. Two words are used several times to indicate comparison. Which are they?
.....

DIRECTIONS FOR ADMINISTERING THE I.E.R. GIRLS ASSEMBLY TEST

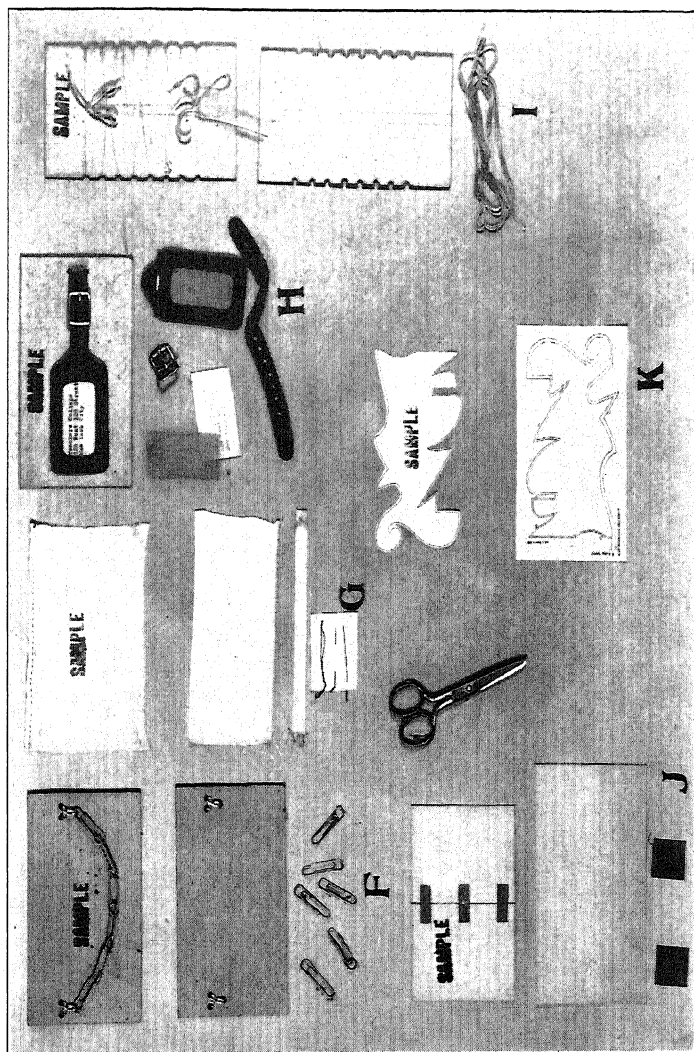
The test may be given to groups of any size, the size being limited only by the number of sets of tests available. Each pupil preferably should have a desk top or three feet of horizontal space on a table, upon which to work. Desks are preferable for the reason that the pupil is less tempted to watch his neighbor at work.

1. Distribute one box of tests and one scoring sheet to each pupil. Have pupils fill out the information blanks at the top of the scoring sheet, and then fold the scoring sheet lengthwise through the middle and place beneath the box out of the way.

2. Instruct the subjects as follows:

“When you open your boxes (wait for the signal), you will find a pair of scissors, a little box, and some envelopes. First, open the little box, which has a big letter A on it, and string the beads *just like the sample*. Then open the envelope marked B and put the parts together so that they will look *just like the sample*. Then take the parts in envelope C and put them together so that they will look *just like the sample*. Then do D, E, and F, and so on. Do not spend too long on any one package, but work as fast as you can and do your work neatly. Ready! Open your boxes; find your scissors; and begin on box A. String the beads so that they will look *just like the sample*.”

3. At this point set your watch at 12 hours 0 minutes 0 seconds. Allow exactly 45 minutes and give the signal: “Stop! Put all your parts, together with the scraps, back into the big box and close your box quickly.”



MATERIAL FOR I.E.R. GIRLS ASSEMBLY TEST

Father's occupation Score

Name Date . . . 19 .

First name Middle name Last name

School grade Age at
LAST birthday Date of birth

month day year

School

A. Cupboard catch. (4 parts) all O.K.	10
Knob and bolt right, spring omitted	5
Spring and bolt right, knob on wrong side	5
Knob and spring right, ends of bolt reversed	5
All other combinations or not attempted	0
B. Clothes pin. (3 parts) all O.K.	10
Spring correctly placed (seated) on one stick	2
Spring seated in groove at wrong end of one only or of both sticks	2
All other combinations or not attempted	0
C. Paper clip. (3 parts) All O.K.	10
Both levers fully inserted from concave side but wrong sides (double bead outwards)	8
Levers correctly inserted, flaring blades partly entering spring, but one or both blades not shoved home	6
Flaring blades barely entering concave side of spring, right sides outward	2
One lever only correctly inserted from concave side (single bead outwards)	2
Both levers fully inserted from <i>convex</i> side and <i>like</i> sides outwards	2
All other combinations or not attempted	0
D. Chain (6 links). All O.K. (Watch the end link)	10
Number of joints correctly made (), 2 credits each	
Any number of links only half (singly) joined	2
All other combinations or not attempted	0

E. Bicycle bell. (5 parts) All O.K. (Spring rings bell on return stroke) 10

Scored by separate parts:—

Cap on, screwed up tight	1
Knocker on pin, correct (gear downwards)	2
reversed	1
not on	0
Pinion gear on pin, correct (brass gear downwards)	2
reversed	1
not on	0
Thumb lever on pin, correct (bearing nut upwards)	2
reversed	1
not on	0
Spring hooked on spring lug	3
All other combinations or not attempted	0

F. Rubber hose shut off. (2 parts) All O.K. (Thumb lever points to bend of spring when closed) 10

Thumb lever above spring pointing outwards when spring is closed 8

Thumb lever inserted in bearings under spring jaw, any position 2

All other combinations or not attempted 0

G. Wire bottle stopper. (5 parts) All O.K. 10

Scored by separate parts:—

Rubber stopper on button	1
Two heavy wires correctly connected	1
Metal button on, when heavy wires are connected	3
Small wire correctly connected to its posts	5
All other combinations or not attempted	0

H. Push button. (4 parts) All O.K. 10

Fibre disk, bottom plate and button O.K. but not snapped	6
Fibre disk and bottom plate O.K. and snapped, but button not in place	4
Button only correct	1
All other combinations or not attempted	0

I. Lock. (6 parts and key) All O.K. (Must be scored by parts)	10
<i>Scored by separate parts:—</i>	
Cover in place with screw in	1
Spring in place, concave side to bolt head	5
Spring in, but wrong side up or ends reversed	3
Key lift lug in place	3
Bolt in place	1
All other combinations or not attempted	0

J. Mouse trap. (6 parts) All O.K.	10
All O.K. except one spring out or incorrectly placed	7
Both springs on, but wrong, otherwise O.K.	4
Loop-lever, rivet, bait-trigger and wire catch right	3
Only loop-lever, rivet and bait-trigger right	1
All other combinations or not attempted	0

STENQUIST MECHANICAL ASSEMBLY SCORING SHEET

APPENDIX II

THE SELECTION OF THE CHILDREN TO BE STUDIED, AND THEIR LIFE HISTORIES

THE Boys Age Group consisted of the boys from 13.0 up to 15.0 in Public School 39, Manhattan,¹ on January 1, 1922. The Girls Age Group consisted of the girls in Public School 39 on April 1, 1922, and those in Public School 159 on June 1, 1922, corresponding to the boys in Public School 39.² These schools were chosen to represent the problem of guidance for children of low economic status, including many with foreign-born parents. It was expected that the task of the follow-up investigations in such a population would include special difficulties; and it did. It may serve as a sample of the possibility of obtaining continuous life histories under even the most unfavorable conditions.

The number of boys 13.0 up to 15.0 was 271. All but 5 of these were followed till they left school. For 215 of them, life histories have been completed to age 22.0 or later. The remaining 56 individuals are accounted for as follows:³

Located but record incomplete	15
Died before age 22.0	7
Moved away and did not respond to letters	7
Never located after leaving school	14
Located and seen but subsequently lost	10
Located but definitely refused information	3

¹ Some children older and younger were included in the tests and some of these have been included in the follow-up study, but everything concerning them will be reported separately. This is true also of the girls in Public School 159.

² The girls in Public School 39 are shifted to Public School 159 at the beginning of grade 7.

³ Status as of October 1, 1932.

Those whose life histories to age 22.0 were completed in time to be used in the analyses of Chapter VI⁴ included 158 who had been at work or seeking work from age 18.0 or earlier. Of these, 70 were engaged at age 20.0 to 22.0 in mechanical work, 33 in clerical work, and 55 in alternations or mixtures of mechanical and clerical work, or in other forms of work.

The number of girls 13.0 up to 15.0 was 203. All but 3 were followed till they left school. For 168 of them, life histories have been completed to age 22.0 or later. The remaining 35 individuals are accounted for as follows: ⁴

Located but record incomplete	14
Died before age 22.0	2
Moved away and did not respond to letters	4
Never located after leaving school	14
Located and seen but subsequently lost	1
Located but definitely refused information	0

Those girls whose histories to age 22.0 were completed in time to be used in the analyses of Chapter VI included 101 who had been at work at least from 19.0 to 21.0. Of them 34 were engaged at age 20.0 to 22.0 in mechanical work, 48 in clerical work, and 19 in alternations or mixtures of mechanical and clerical work or in other forms of work.

Our sampling of the pupils in grade 8B (the Grade Groups) consisted of all the pupils in that grade in November, 1922, in the following eleven public schools of New York City: 3, 11, 18, 27, 40, 64, 74, 76, 91, 147, and 159.

The population of these schools represented the population of the city as a whole fairly closely, so far as we can judge from the distribution of ages in the grades, and of school progress up to this point. Our group is compared with the total 8B population in these respects in Tables A1 and A2.

The number tested in the Boys Grade Group was 826. All but 41 were followed till they left school. For 664 of them, life histories

⁴ Status as of October 1, 1932.

TABLE A 1

Corresponding ranges for age in total 8B population, New York City,
and in Boys and Girls Grade Groups *

DECILE	BOYS		GIRLS	
	<i>Entire city</i>	<i>Grade Group</i>	<i>Entire city</i>	<i>Grade Group</i>
10	11.0-12.6	10.7-12.5	11.0-12.7	10.7-12.4
9	12.7-13.0	12.6-13.0	12.8-13.1	12.5-12.8
8	13.1-13.3	13.1-13.3	13.2-13.3	12.9-13.1
7	13.4-13.5	13.4-13.5	13.4-13.5	13.2-13.4
6	13.6-13.7	13.6-13.8	13.6-13.7	13.5-13.7
5	13.8-14.0	13.9-14.1	13.8-13.9	13.8-14.0
4	14.1-14.3	14.3-14.4	14.0-14.2	14.1-14.3
3	14.4-14.7	14.5-14.8	14.3-14.6	14.4-14.6
2	14.8-15.2	14.9-15.4	14.7-15.1	14.7-15.1
1	15.3-20.0	15.5-17.9	15.2-20.0	15.2-17.9

* Computed from data on page 133 of *Pupil's Progress through the Grades*, Bulletin 19 of the New York City Board of Education, 1922, and from the records of the Vocational Guidance Inquiry.

TABLE A 2

Corresponding ranges for half-year gains in total 8B population, New
York City, and in Boys and Girls Grade Groups *

DECILE	BOYS		GIRLS	
	<i>Entire city</i>	<i>Grade Group</i>	<i>Entire city</i>	<i>Grade Group</i>
10	+2 to +6	+2 to +6	+2 to +6	+2 to +6
9	+1	+1	+1	+1
8	0	+1	0	+1
7	0	0	0	0
6	0	0	0	0
5	-1	-1	-1	0
4	-1	-1	-1	-1
3	-2	-2	-2	-2
2	-3	-3	-3	-3
1	-4 to -9	-4 to -9	-4 to -9	-4 to -9

* Computed from Table LXIX (a) and (b) on pages 150-151 of Bulletin 19 referred to above and from the records of the Vocational Guidance Inquiry.

to age 22.0 or later were completed. The remaining 162 are accounted for as follows: ⁵

Located but record incomplete	63
Located, but not yet aged 22.0	21
Died before age 22.0	13
Moved away and did not respond to letters	16
Never located after leaving school	28
Located and seen, but subsequently lost	9
Located, but definitely refused information	12

Boys whose histories to age 22.0 were completed in time to be used included 494 who had been at work or seeking work from age 19.0 or earlier. Of these 140 were engaged from 20.0 to 22.0 in mechanical work, 190 in clerical work, and 164 in alternations or mixtures of mechanical and clerical work, or in other forms of work.

The number tested in the Girls Grade Group was 925. All but 20 were followed till they left school or later. For 760 of them, life histories to age 22.0 or later were completed. The remaining 165 are accounted for as follows: ⁵

Located but record incomplete	49
Located, but not yet aged 22.0	46
Died before age 22.0	15
Moved away and did not respond to letters	8
Never located after leaving school	29
Located and seen, but subsequently lost	12
Located, but definitely refused information	6

Girls whose histories to age 22.0 were completed in time to be used in Chapter VI included 387 who had been at work or seeking work at least from 19.0 to 21.0. Of these 121 were engaged at

⁵ Status as of October 1, 1932.

age 20.0 to 22.0 in mechanical work, 199 in clerical work, and 67 in alternations or mixtures of mechanical and clerical work or in other forms of work.

The figures given above are summarized below under the heads: 1) those subjects tested in 1921-1922; 2) those followed till they left school; 3) those followed till age 22.0; and 4) those followed till age 22.0 whose records were complete to October 1, 1932. It must be remembered in this connection that the number of subjects analyzed varies with the time at which the analysis was made and that this accounts for the discrepancy in the figures used in the different tables.

	TESTED 1921-1922	FOLLOWED TILL THEY LEFT SCHOOL	FOLLOWED TILL AGE 22.0
Boys Age Group	271	266	215
Girls Age Group	203	200	168
Boys Grade Group	826	785	664
Girls Grade Group	925	905	760
	<hr/> 2,225	<hr/> 2,156	<hr/> 1,807

THOSE WHOSE LIFE HISTORIES TILL AGE 22.0 WERE COMPLETE
TO OCTOBER 1, 1932, CLASSIFIED BY TYPE OF WORK

	<i>M</i>	<i>C</i>	<i>Other</i>	<i>Total</i>
Boys Age Group	70	33	55	158
Girls Age Group	34	48	19	101
Boys Grade Group	140	190	164	494
Girls Grade Group	121	199	67	387
	<hr/> 365	<hr/> 470	<hr/> 305	<hr/> 1,140

The field worker, at no time, abandoned a single effort to get a record from an individual except when the death of the person had been attested by a facsimile of the official certificate. Each temporarily lost individual's record was reviewed regularly to guarantee that no step or clue by which such a person might be located had been

overlooked.⁶ By this means, records now catalogued as *lost* or as *never seen* or even as *refused* may at some subsequent time be completed. By vigorously striving to complete records for each individual, the study has managed to obtain records which under a program oriented in a false economy might never have been completed.

It is important to ascertain to what extent the persons who are recorded as lost, or as never seen, or as moved, or as having refused information, differed from their fellows at age 14.0. This can be done by considering their respective deviations from the mean of the respective groups in each of the test items. We report here the relevant information with reference to rate of school progress, tests of intelligence, scholarship, conduct, and attendance.

The group of boys and girls who moved away were inferior to their fellows in one measure of school progress and superior in another. They were slightly superior in one test of intelligence and slightly inferior in another. Their conduct marks, on the average, were slightly inferior to those in the group from which they were selected; their scholarship, a little above the average. There is thus no selective factor apparent in the early records of these persons who moved away and did not respond to letters after such removal.

The group who at one time were located and who have subsequently been lost to the inquiry were, in general, inferior to their fellows; not markedly so, but consistently so. There is thus evidence that those persons were, more frequently than chance would allow, chronic movers, or engaged in activities the legality of which may be questioned, or in social strata so low that suspiciousness barred the field worker from receiving any information.

Those persons who were never seen were also lower in measures of school progress, in intelligence, and in scholarship. They were not markedly different from their fellows in conduct, but were demonstrably inferior in attendance.

Those persons who refused to cooperate with the study were, on the average, slightly inferior in both measures of rate of school

⁶ For the technique of follow-up, see Appendix VI.

progress; were approximately at the mean in one measure of intelligence, and a little above the mean in another. They were very slightly inferior in conduct and in attendance. It seems that the factors that make for refusal of information are personal eccentricities uncorrelated with the abilities that concern us.

These four groups for whom records have not been obtained for the reasons mentioned, were in general slightly inferior to their fellows. There is nothing in these records to indicate that the omission of the later work records of these persons in any way changes the general tenor of the results presented in Chapters V to VIII.

APPENDIX III

THE TRANSMUTATION OF TEST SCORES TO ESTIMATED SCORES AT AGE 14.0

TO transmute the reading score (Item 8), we use Table A3. This is derived from the tables of standard scores at different ages published in the *Manual of Directions* of the Thorndike-McCall Reading Scale, published by Teachers College, Columbia University, New York.

From the published norms of the arithmetic scores in the Stanford Achievement Tests (Elementary and Advanced) and in the Otis Arithmetical Reasoning Test, it is clear that the age differences, 12.0 to 13.0, 13.0 to 14.0, 14.0 to 15.0, and 15.0 to 16.0, are approximately equal (22, 22, 24, and 24 for Stanford Elementary; 11, 10, 11, and 12 for Stanford Advanced; and 1.50, 1.62, 1.63, and 1.50 for Otis). There is a very slight increase, perhaps 2 per cent per year.

From the somewhat scanty results of our testing with the arithmetic test of all the thirteen-year-olds and fourteen-year-olds in one school and of all the pupils in that school in grades 6B to 8B inclusive, we may compute the difference in score due to approximately a year of age near age 14.0 by the differences between the scores of twelve-year-olds in 6B, thirteen-year-olds in 7B, and fourteen-year-olds in 8B. These differences correspond to somewhat over a year of age because the average pupil requires somewhat more than a year to progress from 6B to 7B or from 7B to 8B.

Our determinations are, using boys and girls and medians and averages,

	<i>B.M.</i>	<i>B. Av.</i>	<i>G.M.</i>	<i>G. Av.</i>	<i>Av.</i>
12.5 to 13.5	2.0	1.5	1.5	1.0	1.5
13.5 to 14.5	1.0	0.7	1.0	0.9	0.9

TABLE A 3

To estimate the reading score at age 14.0 from the score at any age

AGE	ADD	AGE	ADD	AGE	ADD	AGE	ADD
10.0	16	11.0	12	12.0	8	13.0	4
10.1	16	11.1	12	12.1	8	13.1	3
10.2	16	11.2	12	12.2	7	13.2	3
10.3	15	11.3	11	12.3	7	13.3	3
10.4	15	11.4	11	12.4	6	13.4	2
10.5	14	11.5	10	12.5	6	13.5	2
10.6	14	11.6	10	12.6	5	13.6	1
10.7	14	11.7	9	12.7	5	13.7	1
10.8	13	11.8	9	12.8	5	13.8	1
10.9	13	11.9	9	12.9	4	13.9	0

AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT
14.0	0	15.0	4	16.0	8	17.0	12
14.1	0	15.1	4	16.1	9	17.1	13
14.2	1	15.2	5	16.2	9	17.2	13
14.3	1	15.3	5	16.3	9	17.3	14
14.4	1	15.4	5	16.4	10	17.4	14
14.5	2	15.5	6	16.5	10	17.5	14
14.6	2	15.6	6	16.6	11	17.6	15
14.7	3	15.7	7	16.7	11	17.7	15
14.8	3	15.8	7	16.8	12	17.8	16
14.9	3	15.9	8	16.9	12	17.9	16

We may do the same using twelve-year-olds in 7A and thirteen-year-olds in 8A and thirteen-year-olds in 7A and fourteen-year-olds in 8A. Our determinations by these data give averages of $0.5\frac{1}{2}$ for 12.5 to 13.5, and 1.9 for 13.5 to 14.5.

The average of the two sets with equal weight is 1.0 for 12.5 to 13.5, and 1.4 for 13.5 to 14.5. The first set involves 185 individuals; the second, 97. If we weight as 2 to 1 we have 1.2 for 12.5 to 13.5, and 1.2 for 13.5 to 14.5. So the age gain in scores in our tests may well be in conformity with the general fact shown by the much richer material of the Stanford and Otis tests.

TABLE A 4

To estimate the arithmetic score at age 14.0 from the score at any age

AGE	ADD	AGE	ADD	AGE	ADD
11.0	10	12.0	6	13.0	3
11.1	9	12.1	6	13.1	3
11.2	9	12.2	6	13.2	3
11.3	9	12.3	5	13.3	2
11.4	8	12.4	5	13.4	2
11.5	8	12.5	5	13.5	2
11.6	8	12.6	4	13.6	1
11.7	7	12.7	4	13.7	1
11.8	7	12.8	4	13.8	1
11.9	7	12.9	4	13.9	0

AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT
14.0	0	15.0	3	16.0	6	17.0	10
14.1	0	15.1	4	16.1	7	17.1	10
14.2	1	15.2	4	16.2	7	17.2	10
14.3	1	15.3	4	16.3	7	17.3	11
14.4	1	15.4	4	16.4	8	17.4	11
14.5	2	15.5	2	16.5	8	17.5	11
14.6	2	15.6	5	16.6	8	17.6	12
14.7	2	15.7	5	16.7	9	17.7	12
14.8	3	15.8	6	16.8	9	17.8	12
14.9	3	15.9	6	16.9	9	17.9	12

It seems best therefore to assume that if we had a large random sampling of all ages 12.0 to 16.0 in our arithmetic test, the age differences 12.0 to 13.0, 13.0 to 14.0, etc., would be approximately equal, possibly increasing a little year by year, and that their average amount would be near 1.2 per year. They will be somewhat less than that because, as stated earlier, the fourteen-year-olds are somewhat superior in native promise to the thirteen-year-olds one grade lower (8B *vs.* 7B, or 8A *vs.* 7A, or 7B *vs.* 6B, etc.). In general, the normal difference due to a year of age is a little less than the difference between age A in grade G and age A-1 in grade G-1. Either 1.1 or 1.0 is a reasonable estimate.

TABLE A 5

To estimate the score in the clerical intelligence test (C1) at age 14.0
from the score at any age

AGE	ADD	AGE	ADD	AGE	ADD
11.0	27	12.0	18	13.0	9
11.1	26	12.1	17	13.1	8
11.2	25	12.2	16	13.2	7
11.3	24	12.3	15	13.3	6
11.4	23	12.4	14	13.4	5
11.5	22	12.5	13	13.5	4
11.6	21	12.6	12	13.6	3
11.7	20	12.7	11	13.7	2
11.8	19	12.8	10	13.8	2
11.9	18	12.9	9	13.9	1

AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT
14.0	0	15.0	8	16.0	15	17.0	20
14.1	1	15.1	9	16.1	16	17.1	21
14.2	2	15.2	9	16.2	16	17.2	21
14.3	2	15.3	10	16.3	17	17.3	22
14.4	3	15.4	11	16.4	17	17.4	22
14.5	4	15.5	12	16.5	18	17.5	22
14.6	5	15.6	12	16.6	18		
14.7	6	15.7	13	16.7	19		
14.8	6	15.8	14	16.8	19		
14.9	7	15.9	14	16.9	20		

So we estimate what each child's score in the arithmetic test (after multiplication by 3 to give it weight equal to the reading score in the arithmetic-reading composite) will be at age 14.0 by adding 3.2 for each year under 14.0, and subtracting 3.2 for each year over 14.0, using Table A4.

Our records with the clerical intelligence test (C1) in Public School 39 and Public School 159 show average superiorities of thirteen-year-olds over twelve-year-olds a full grade lower, of fourteen-year-olds over thirteen-year-olds a full grade lower, and of

TABLE A 6

To estimate the score in the clerical activities test (C2) at age 14.0 from the score at any age

AGE	ADD	AGE	ADD	AGE	ADD
11.0	15	12.0	9	13.0	4
11.1	14	12.1	9	13.1	4
11.2	13	12.2	8	13.2	4
11.3	13	12.3	8	13.3	3
11.4	12	12.4	7	13.4	3
11.5	11	12.5	7	13.5	2
11.6	11	12.6	6	13.6	2
11.7	10	12.7	6	13.7	1
11.8	10	12.8	5	13.8	1
11.9	10	12.9	5	13.9	0

AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT
14.0	0	15.0	4	16.0	7	17.0	9
14.1	0	15.1	4	16.1	7	17.1	9
14.2	1	15.2	5	16.2	8	17.2	9
14.3	1	15.3	5	16.3	8	17.3	9
14.4	2	15.4	5	16.4	8	17.4	10
14.5	2	15.5	6	16.5	8	17.5	10
14.6	2	15.6	6	16.6	8	17.6	10
14.7	3	15.7	6	16.7	9	17.7	10
14.8	3	15.8	7	16.8	9	17.8	10
14.9	4	15.9	7	16.9	9	17.9	10

fifteen-year-olds over fourteen-year-olds a full grade lower, of 9.3, 7.8, and 8.5, respectively. In view of the general age changes reported for intelligence tests, it seems wise to make the allowances: 12.0 to 13.0=9, 13.0 to 14.0=9, and 14.0 to 15.0=8 rather than, respectively, 9.3, 7.8, and 8.5, and to decrease them to 7 for 15.0 to 16.0, and to 5 for 16.0 to 17.0. There is some reason for making different allowances for boys and girls, but the desirability of a simple system counterbalances this. So we use the allowances of Table A5.

TABLE A 7

Average scores in clerical activities test (C2). Classification by age and grade for selected pupils in normal progress classes, 1921 and 1930.

Av.=average score. n=number of pupils

DATA OF 1930				DATA OF 1921			
<i>Age</i>	<i>Grade</i>	<i>Av.</i>	<i>n</i>	<i>Age</i>	<i>Grade</i>	<i>Av.</i>	<i>n</i>
10	6	17.0	31	12	6	20.2	34
11	7	24.3	64	13	7	23.9	29
12	8	28.3	54	14	8	26.2	26
13	9	31.9	15				
				12	7	24.1—	22
10	7	24.8	5	13	8	26.1+	24
11	8	28.5	11				
12	9	31.2	6	13	5	15.5	13
				14	6	21.1	15
11	6	17.5	48	15	7	19.6	10
12	7	22.8	81				
13	8	28.5	62	13	6	18.4	30
14	9	31.5	45	14	7	22.0	25
				15	8	22.3	11
13	6	14.8	8				
14	7	23.2—	12	14	5	15.6	10
15	8	24.7+	7	15	6	19.7	14
12	6	13.3	21				
13	7	22.3+	29				
14	8	28.9	35				
15	9	34.4	29				
14	6	11.3	6				
15	7	28.6	3				

In the case of C2, the I. E. R. Clerical Capacity Test, we assign the probable score at age 14.0 for any given score at any given age from Table A6.

The derivation of this table was as follows: In 1921, this test (I. E. R. Clerical Capacity C2, Form B) had been given to the

girls in the normal progress classes in grades 6, 7, and 8 and to all girls aged 13, 14, or 15 located in grades below the sixth in Public Schools 39 and 159. Of this group who were located in grades 5, 6, 7, or 8, 56 were between ages 12:0 and 12:11; 96 between ages 13:0 and 13:11; 76 between ages 14:0 and 14:11; and 35 between ages 15:0 and 15:11. To supplement these records, 581 pupils (346 boys and 235 girls) located in normal progress grades in New York City elementary schools were given the test in June, 1930. Of these pupils, 118 were in the sixth, 194 in the seventh, 169 in the eighth, and 100 in the ninth grade. According to age, 36 were between 10 years 0 months and 10 years 11 months; 123 between 11:0 and 11:11; 162 between 12:0 and 12:11; 114 between 13:0 and 13:11; 98 between 14:0 and 14:11; and 39 between 15:0 and 15:11.¹

Table A7 presents the average score obtained on the I. E. R. Clerical Capacity Test, C2, by each age group. Thus, the group who were between ages 10:0 and 10:11 located in grade 6 in the 1930 testing had an average score of 17.0 based on 31 cases. From these data, Table A8 is derived in the following manner: the difference between the average score of the ten-year-olds in grade 6 and that of the eleven-year-olds in grade 7 is weighted by the number of cases contributing to that difference. Similarly, individuals of age 13 in grade 6 are compared with individuals of age 14 in grade 7, individuals of age 14 in grade 7 with individuals of age 15 in grade 8, and so on. The differences will measure approximately the average gain in score made by an individual from age 12.5 to age 13.5, age 13.5 to age 14.5, age 14.5 to age 15.5, etc. They will be a little too large since the children on the average took more than one year to complete one grade in the New York schools at that time.

In constructing Table A6, therefore, we took age 12.0 to 13.0 as 5, 13.0 to 14.0 as 4, 14.0 to 15.0 as 4, and 15.0 to 16.0 as 3. That is, we used values a little lower than those of Table A8 to allow for the fact that average progress is less than one grade a year, and

¹ Nine pupils were either older than 16:0, or younger than 10:0, or failed to report birth date.

TABLE A 8

Differences in average scores in clerical activities test (C2), of selected pupils in normal progress grades, 1921 and 1930, classified by age and grade. d =difference in scores. n =number of children used in obtaining the difference

AGE	GRADE 5 TO 6		GRADE 6 TO 7		GRADE 7 TO 8		GRADE 8 TO 9		AVERAGE DIFFERENCE			
	d	n	d	n	d	n	d	n	U_{new}	W^2d	$by\ n$	W^2d $by\ \sqrt{n}$
10.5 to 11.5												
			7.3	94	3.7	16			5.0	6.8	6.5	6.5
11.5 to 12.5			5.3	129	4.0	118	2.7	17	4.0	4.6	4.5	4.5
12.5 to 13.5			9.1	50	5.7	143	3.6	69	4.8	5.0	4.7	4.7
			3.7	63	2.1	46						
13.5 to 14.5	5.6	28	8.4	20	6.6	64	3.0	107	4.2	4.5	4.4	4.4
			3.6	55	2.3	55						
14.5 to 15.5	4.1	24	17.3	9	1.6	19	5.5	64	3.4	3.7	3.6	3.6
			-1.5	25	0.3	36						

assumed that the amount of annual gain would continue to diminish after age 15.5. Table A6 is extended down to age 11.0 and up to age 17.9 by the facts of Table A8 and reasonable hypotheses. These extensions operate in the case of only a very few of the children studied, 95 per cent being between ages 12.5 and 16.0 at the time of the test. In adjusting scores in the mechanical adroitness (Stenquist Assembly) test to age 14.0 base, we made use of the following facts:

Stenquist² reports as central tendencies at ages 12.5, 13.5, 14.5, and 15.5 respectively, 30, 37, 41, and 49 for his Series I. Adults in the army had a central tendency of 59.

Toops³ found central tendencies for these ages 34, 38.4, 45.2, and 44.1, with 70.1 for pupils in grade 9 (first year of high school) and 72.7 for university men students. As average differences 12.5 to 13.5, 13.5 to 14.5, and 14.5 to 15.5, we have: 5.8, 5.6, and 3.6.

Bearing in mind that fifteen-year-olds found in elementary school will be inferior to fifteen-year-olds in general, and noting that first-year high school pupils were 16 above fourteen-year-olds and that the sampling of adults in the army was 18 above fourteen-year-olds, we estimate the age differences for Stenquist Series I as 6 for 12.5 to 13.5, 6 for 13.5 to 14.5, 6 for 14.5 to 15.5, 5 for 15.5 to 16.5, and 4½ for 16.5 to 17.5. On this basis we construct Table A9 shown on page 146. Its extension down to age 11.0 is hypothetical, and assumes that the steady change found from 12.5 to 14.5 will hold from 11.0 to 12.5.

To transmute the I. E. R. Assembly Test of mechanical ability in the case of girls, we rely on the records of the unselected population of girls in Public School 39 and Public School 159, and to some extent on analogy with the Stenquist Assembly Test. Taking the differences between fifteen-year-olds and fourteen-year-olds a

² *Measurements of Mechanical Ability* (New York: Teachers College, Columbia University, 1923), p. 45.

³ *Tests for Vocational Guidance of Children Fourteen to Sixteen* (New York: Teachers College, Columbia University, 1923), p. 110.

TABLE A 9

To estimate the score in the mechanical adroitness (Stenquist Assembly) test at age 14.0 from the score at any age

AGE	ADD	AGE	ADD	AGE	ADD
11.0	17	12.0	11	13.0	6
11.1	16	12.1	11	13.1	5
11.2	16	12.2	10	13.2	5
11.3	15	12.3	10	13.3	4
11.4	15	12.4	9	13.4	3
11.5	14	12.5	9	13.5	3
11.6	14	12.6	8	13.6	2
11.7	13	12.7	8	13.7	1
11.8	12	12.8	7	13.8	1
11.9	12	12.9	6	13.9	0

AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT
14.0	0	15.0	6	16.0	11	17.0	17
14.1	0	15.1	6	16.1	12	17.1	17
14.2	1	15.2	7	16.2	12	17.2	18
14.3	1	15.3	8	16.3	13	17.3	18
14.4	2	15.4	8	16.4	14	17.4	18
14.5	3	15.5	9	16.5	14	17.5	19
14.6	3	15.6	9	16.6	15	17.6	19
14.7	4	15.7	10	16.7	15	17.7	19
14.8	5	15.8	10	16.8	16	17.8	20
14.9	5	15.9	11	16.9	16	17.9	20

whole grade lower, fourteen-year-olds and thirteen-year-olds a whole grade lower, and thirteen-year-olds and twelve-year-olds a whole grade lower, and computing weighted average differences for each of the three, we have 3.45, 7.82, and 6.04, using medians, and 4.60, 6.10, and 6.56, using averages, for 15.5 to 14.5, 14.5 to 13.5, and 13.5 to 12.5 respectively. The fifteen-year-olds are, of course, a little duller than the fourteen-year-olds a grade lower with whom they are compared, and in view of the data derived from the Stenquist Assembly Test, results for the fourteen-to-fifteen-year difference,

TABLE A 10

To estimate the score in the mechanical adroitness (I.E.R. Assembly) test at age 14.0 from the score at any age

AGE	ADD	AGE	ADD	AGE	ADD
11.0	18	12.0	12	13.0	6
11.1	17	12.1	11	13.1	5
11.2	17	12.2	11	13.2	5
11.3	16	12.3	10	13.3	4
11.4	16	12.4	10	13.4	4
11.5	15	12.5	9	13.5	3
11.6	14	12.6	8	13.6	2
11.7	14	12.7	8	13.7	2
11.8	13	12.8	7	13.8	1
11.9	13	12.9	7	13.9	1

AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT	AGE	SUB-TRACT
14.0	0	15.0	6	16.0	11	17.0	16
14.1	1	15.1	7	16.1	12		
14.2	1	15.2	7	16.2	12		
14.3	2	15.3	8	16.3	13		
14.4	2	15.4	8	16.4	13		
14.5	3	15.5	9	16.5	14		
14.6	4	15.6	9	16.6	14		
14.7	4	15.7	10	16.7	15		
14.8	5	15.8	10	16.8	15		
14.9	5	15.9	11	16.9	16		

derived from only 33 fifteen-year-olds, should be used with care. The average for a year is 5.8 by both methods. In view of the results derived from using the Stenquist test we use 6.0 as the differences due to a year's age increment up to age 15.0 and 5.0 thereafter, as shown in Table A10.

In the case of the Age Groups the grade which would be reached at age 14.0 was estimated from the grade at the time of the test and the age at January 1, 1922, by Table A11. Table A11 is constructed on the assumption that the pupil was aged 6.25 at entrance and

TABLE A 11

To estimate the grade reached at age 14.0 for a pupil in any grade 3A to 8B at any age 12.0 to 16.5. The entries 5, 6, 7, 8 . . . 21 signify respectively grades 3A, 3B, 4A, 4B . . . 11A

AGE	GRADE											
	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B
12.0	6	8	9	10	12	13	14	16	17	19	20	21
12.1	6	8	9	10	12	13	14	16	17	18	20	21
12.2	6	8	9	10	11	13	14	15	17	18	19	21
12.3	6	7	9	10	11	13	14	15	17	18	19	20
12.4	6	7	9	10	11	12	14	15	16	18	19	20
12.5	6	7	8	10	11	12	14	15	16	17	19	20
12.6	6	7	8	10	11	12	13	14	16	17	18	19
12.7	6	7	8	9	11	12	13	14	16	17	18	19
12.8	6	7	8	9	11	12	13	14	15	17	18	19
12.9	6	7	8	9	10	12	13	14	15	16	18	19
13.0	6	7	8	9	10	11	13	14	15	16	17	18
13.1	6	7	8	9	10	11	12	14	15	16	17	18
13.2	5	7	8	9	10	11	12	13	14	16	17	18
13.3	5	7	8	9	10	11	12	13	14	15	17	18
13.4	5	6	8	9	10	11	12	13	14	15	16	17
13.5	5	6	7	9	10	11	12	13	14	15	16	17
13.6	5	6	7	9	9	11	12	13	14	15	16	17
13.7	5	6	7	9	9	10	11	12	14	15	16	17
13.8	5	6	7	9	9	10	11	12	13	14	15	16
13.9	5	6	7	9	9	10	11	12	13	14	15	16
14.0	5	6	7	9	9	10	11	12	13	14	15	16
14.1	5	6	7	9	9	10	11	12	13	14	15	16
14.2	5	6	7	9	9	10	11	12	13	14	15	16
14.3	5	6	7	9	9	10	11	12	13	14	14	15
14.4	5	6	7	9	9	10	10	11	12	13	14	15

that if he was under 14.0 at the time of observation, his rate of progress from then to age 14.0 was the same as his rate up to the

TABLE A11 (*continued*)

AGE	GRADE											
	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B
14.5	5	6	7	8	8	9	10	11	12	13	14	15
14.6	5	6	7	8	8	9	10	11	12	13	14	15
14.7	5	6	7	8	8	9	10	11	12	13	14	15
14.8	5	6	6	8	8	9	10	11	12	13	14	14
14.9	5	5	6	8	8	9	10	11	12	13	13	14
15.0	5	5	6	8	8	9	10	11	12	12	13	14
15.1	4	5	6	7	8	9	10	11	11	12	13	14
15.2	4	5	6	7	8	9	10	10	11	12	13	14
15.3	4	5	6	7	8	9	9	10	11	12	13	14
15.4	4	5	6	7	8	9	9	10	11	12	13	14
15.5	4	5	6	7	8	8	9	10	11	12	13	13
15.6	4	5	6	7	8	8	9	10	11	12	13	13
15.7	4	5	6	7	7	8	9	10	11	12	12	13
15.8	4	5	6	7	7	8	9	10	11	12	12	13
15.9	4	5	6	7	7	8	9	10	11	11	12	13
16.0	4	5	6	6	7	8	9	10	10	11	12	13
16.1	4	5	6	6	7	8	9	10	10	11	12	13
16.2		5	6	6	7	8	9	9	10	11	12	13
16.3		5	5	6	7	8	9	9	10	11	12	12
16.4		5	5	6	7	8	8	9	10	11	11	12
16.5		5	5	6	7	8	8	9	10	11	11	12

time of observation. If he was over 14.0 at the time of observation, it is assumed that his rate of progress from 14.0 to then was the same as his rate from the time of entering school until 14.0. The entries 5, 6, 7, 8, 9 . . . 21 in Table A11 signify respectively grades 3A, 3B, 4A, 4B, 5A . . . 11A. The first line, for example, relates that a child who, at 12.0, had only reached 3A would, at 14.0, probably reach only 3B.

APPENDIX IV

THE DERIVATION OF SCHOLARSHIP MARKS FOR INDIVIDUALS NOT CONTINUING IN SCHOOL BE- YOND GRADES 9, 8B, 8A, 7, OR 6

BY ELLA WOODYARD

THE score for school marks following the tests was obtained as follows. If the individual attended a senior high school, his median mark for each grade was computed and the average of these medians used as his score. If he repeated a grade, the marks obtained in his first trial of it were the ones used. We found by a special investigation not reported here, that the standards for marks in the New York City high schools were such that any given median mark has nearly or quite the same significance regardless of whether it is given in an early or a late grade. In the case of a random sampling of 42 pupils who continued through senior high school, the average medians were, in order from 9A to 12B, $73\frac{1}{2}$, $72\frac{1}{3}$, $72\frac{1}{2}$, 72, 72, 70, 74, $75\frac{1}{2}$.

We are thus justified in using the score described above, whether it is obtained from a record in 9A, or one in 9A and 9B, or one in 9A, 9B, and 10A, or one in 9A, 9B, 10A, and 10B, and so on. The averages for the eight possible sources of our score by the random sample would be, in order, $73\frac{1}{2}$, $73\frac{1}{2}$, $73\frac{1}{6}$, $72\frac{7}{8}$, $72\frac{7}{10}$, $72\frac{1}{4}$, $72\frac{1}{2}$, $72\frac{7}{8}$.

If the individual completed only grade 9 in a junior high school, or did not even reach grade 9 at all, we inferred what his score in a senior high school, computed as above, would probably have been, had he continued in school. These inferences were based on his school marks, 1) for first trials in grade 9 in junior high school, or 2) in grade 8 in junior high school if he did not reach grade 9, or 3) in

the highest grade he reached if he did not reach grade 8. For each such grade in each school the records of pupils who *did* go on to senior high school were studied, so that we learned, for example, that a median mark of 68 in grade 8 of School X implied a probable median mark in senior high school of 61. The details of this investigation are reported below.

The number of individuals in the case of whom the score in high school marks (Item 20) had to be thus inferred from school records in grade 9, 8, or lower, instead of computed directly from marks in senior high school, was 1,422 or about 55 per cent of the entire group.

DERIVATION OF HIGH SCHOOL MARKS FOR PUPILS NOT CONTINUING
IN SCHOOL BEYOND GRADE 9

We record the marks in senior high school¹ of all pupils in each junior high school grouped according to the marks which they received in grade 9 of the junior high school, and compute the central tendencies of the former. These are reported in Tables A12 and A13. Thus Table A12 relates that the three individuals in Public School 24 who had median marks of 63-67 in its ninth grade and then were transferred to a senior high school, received marks there the median of which was 68, that the seven individuals in Public School 24 who had median marks of 68-72 in its ninth grade, and then were transferred to a senior high school, received marks there the median of which was 68, and similarly for those with marks of 73-77, 78-82, 83-87, 88-92, and 93-97.²

Tables A14 and A15 are computed from Tables A12 and A13 by subtraction within each school.

¹ Senior high school will be used in this Appendix to mean a high school having grades 9, 10, 11, and 12. Perhaps "regular high school" would be a better term. Pupils from junior high schools enter grade 10 of a senior high school.

² To guard against possible misunderstanding, we note that P. S. 24 was not one of the schools in which the testing was done, but a school to which some of our boys transferred later.

TABLE A 12

Median senior high school marks of pupils having median marks of 63-67, 68-72, etc., in grade 9 of six junior high schools. The number of pupils in each case is given in parentheses

SCHOOL	MEDIAN MARK IN GRADE 9, JUNIOR HIGH SCHOOL				
	63-67	68-72	73-77	78-82	83-87
<i>Boys</i>					
No. 24	68 (3)	68 (7)	72 (5)	73.5 (2)	73 (2)
No. 40		66.5 (8)	66 (4)	70 (2)	76 (5)
No. 64	59 (8)	65 (36)	67.5 (30)	73 (17)	75 (2)
<i>Girls</i>					
No. 3		69 (2)	73 (1)	73 (3)	75 (7)
No. 91	66.5 (2)	63 (5)	70 (21)	70.5 (16)	73 (17)
No. 159	56.5 (4)	65 (24)	65 (24)	68.5 (52)	72 (41)
					83.5 (4)
					79.5 (12)
					73 (33)
					84 (3)

TABLE A 13

Average senior high school marks of pupils having average marks of 63-67, 68-72, etc., in grade 9 of six junior high schools

SCHOOL	AVERAGE MARK IN GRADE 9, JUNIOR HIGH SCHOOL						
	63-67	68-72	73-77	78-82	83-87	88-92	93-97
<i>Boys</i>							
No. 24	68.3	66.3	71.2	73.5	73.0		
No. 40		66.1	68.8	70.0	74.6		
No. 64	59.5	64.4	67.4	72.8	75.0		
<i>Girls</i>							
No. 3		68.5	73.0	74.3	74.3	82.3	
No. 91	66.5	63.6	68.5	69.5	73.5	79.0	
No. 159	58.0	63.7	64.6	68.7	71.7	74.1	84.3

NOTE: For the number of pupils in each case, see Table A12.

In the case of the ninth-grade marks, we may reasonably, from the weighted averages of Table A15, set the general significance of marks of 65, 70, 80, 85, and 90 as -6, -3, +3, +6, and +10 below or above that corresponding to the mark of 75. That of 95 we put as +15, having regard not only to the obtained +19.0 and +19.7 from three cases, but also to the facts of Tables A19 and A20. We extrapolate to -9 for 60, and -12 for 55, and -15 for 50, to provide for any individuals who may be found with ninth-grade median marks as low as that. As the result, we have Table A16, which we use in computing the probable scores in Item 20 (average high school marks) of pupils who attended grade 9 in a junior high school, but did not attend a senior high school.

DERIVATION OF HIGH SCHOOL MARKS FOR PUPILS NOT CONTINUING IN SCHOOL BEYOND GRADE 8B

By a procedure like that just described for ninth-grade marks, we study the records of all pupils from Schools 24, 40, 64, 3, 91, and 159 who did attend senior high school. The facts appear in Tables A17, A18, A19, and A20.

TABLE A 14

Divergence of the median senior high school mark from that of pupils in the same school having a median mark of 73-77 in grade 9 of six junior high schools

SCHOOL	MEDIAN MARK IN GRADE 9, JUNIOR HIGH SCHOOL						
	63-67	68-72	73-77	78-82	83-87	88-92	93-97
<i>Boys</i>							
No. 24	-4.0	-4.0	0	+1.5	+1.0		
No. 40		-0.5	0	+4.0	+10.0		
No. 64	-8.5	-2.5	0	+5.5	+7.5		
<i>Girls</i>							
No. 3		-4.0	0	0.0	+2.0	+10.5	
No. 91	-3.5	-7.0	0	+0.5	+3.0	+9.5	
No. 159	-8.5	0.0	0	+3.5	+7.0	+8.0	+19.0
Weighted average	-6.7	-2.3	0	+2.9	+5.9	+8.9	+19.0

NOTE: For the number of pupils in each case, see Table A12.

TABLE A 15

Divergence of the average senior high school mark from that of pupils in the same school having an average mark of 73-77 in grade 9 of six junior high schools

SCHOOL	AVERAGE MARK IN GRADE 9, JUNIOR HIGH SCHOOL						
	63-67	68-72	73-77	78-82	83-87	88-92	93-97
<i>Boys</i>							
No. 24	-2.9	-4.9	0	+2.3	+1.8		
No. 40		-2.7	0	+1.2	+5.8		
No. 64	-7.9	-3.0	0	+5.4	+7.6		
<i>Girls</i>							
No. 3		-4.5	0	+1.3	+1.3	+9.3	
No. 91	-2.0	-4.9	0	+1.0	+5.0	+10.5	
No. 159	-6.6	-0.9	0	+4.1	+7.1	+9.5	+19.7
Weighted average	-5.5	-3.0	0	+3.2	+5.5	+9.8	+19.7

NOTE: For the number of pupils in each case, see Table A12.

TABLE A 16

Estimated score in Item 20 (average scholarship mark in senior high school) for a pupil attaining any average mark from 50 to 95 in grade 9 of any of six junior high schools and from 96 to 100 in one school

SCHOOL	AVERAGE MARK IN GRADE 9, JUNIOR HIGH SCHOOL															
	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Boys																
No. 24											56	57	57	58	58	59
No. 40											52	53	53	54	54	55
No. 64											52	53	53	54	54	55
Girls																
No. 3											58	59	59	60	60	61
No. 91											54	55	55	56	56	57
No. 159											50	51	51	52	52	53
Boys	56	57	58	58	59	60	61	62	63	64	65	66	67	68	69	70
No. 24	60	60	61	61	61	62	62	63	63	64	65	65	66	66	67	68
No. 40	56	56	57	57	57	58	58	59	59	60	61	61	62	62	63	64
No. 64	56	56	57	57	57	58	58	59	59	60	61	61	62	62	63	64
Girls																
No. 3	62	62	63	63	63	64	64	65	65	66	67	67	68	68	69	70
No. 91	58	58	59	59	59	60	60	61	61	62	63	63	64	64	65	66
No. 159	54	54	55	55	55	56	56	57	57	58	59	59	60	60	61	62

TABLE A 16 (continued)

SCHOOL	AVERAGE MARK IN GRADE 9, JUNIOR HIGH SCHOOL														
	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
<i>Boys</i>															
No. 24	68	69	69	70	71	71	72	72	73	74	74	75	75	76	77
No. 40	64	65	65	66	67	67	68	68	69	70	70	71	71	72	73
No. 64	64	65	65	66	67	67	68	68	69	70	70	71	71	72	73
<i>Girls</i>															
No. 3	70	71	71	72	73	73	74	74	75	76	76	77	77	78	79
No. 91	66	67	67	68	69	69	70	70	71	72	72	73	73	74	75
No. 159	62	63	63	64	65	65	66	66	67	68	68	69	69	70	71
<i>Boys</i>															
No. 24	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
No. 40	78	79	80	80	81	82	83	84	85	86	87	88	89	90	91
No. 64	74	75	76	76	77	78	79	80	81	82	83				
No. 64	74	75	76	76	77	78	79	80	81	82					
<i>Girls</i>															
No. 3	80	81	82	82	83	84	85	86	87	88					
No. 91	76	77	78	78	79	80	81	82	83	84					
No. 159	72	73	74	74	75	76	77	78	79	80					

TABLE A 17

Median senior high school marks of pupils having median marks of 58-62, 63-67, etc., in grade 8B of six junior high schools. The number of pupils in each case is given in parentheses

SCHOOL	MEDIAN MARK IN GRADE 8B								
	58-62	63-67	68-72	73-77	78-82	83-87	88-92	93-97	98-100
<i>Boys</i>									
No. 24		62.5 (2)	67.5 (4)	70.0 (8)	75.0 (3)	73.0 (2)			
No. 40	63.0 (3)	67.0 (5)	67.0 (13)	64.0 (15)	69.0 (11)	66.0 (6)	74.5 (6)	77.0 (1)	81.5 (2)
No. 64	66.0 (2)	63.5 (22)	65.0 (22)	67.0 (34)	69.0 (15)	73.0 (8)	89.0 (1)		
<i>Girls</i>									
No. 3		69.0 (1)	72.0 (2)	76.0 (3)	76.5 (6)	78.0 (6)			
No. 91	70.0 (5)	64.5 (14)	70.0 (19)	71.0 (15)	76.0 (16)	81.5 (4)			
No. 159	61.0 (2)	67.0 (7)	67.0 (15)	65.5 (42)	68.0 (77)	71.5 (46)	73.5 (22)		

TABLE A 18

Average senior high school marks of pupils having average marks of 58-62, 63-67, etc., in grade 8B of six junior high schools

SCHOOL	AVERAGE MARK IN GRADE 8B								
	58-62	63-67	68-72	73-77	78-82	83-87	88-92	93-97	98-100
Boys									
No. 24		62.5	66.5	71.4	67.7	73.0			
No. 40	61.3	67.0	63.9	64.0	68.5	65.0	74.0	77.0	81.5
No. 64	66.0	63.2	63.6	66.3	67.7	74.0	89.0		
Girls									
No. 3		69.0	72.0	75.0	75.7	77.0			
No. 91	68.6	65.9	70.5	70.1	77.0	81.5			
No. 159	61.0	66.7	63.5	66.0	68.1	71.2	74.9		

NOTE: For the number of pupils in each case, see Table A17.

TABLE A 19

Divergence of the median senior high school mark from that of pupils in the same school having a median mark of 73-77 in grade 8B of six junior high schools

SCHOOL	MEDIAN MARK IN GRADE 8B								
	58-62	63-67	68-72	73-77	78-82	83-87	88-92	93-97	98-100
<i>Boys</i>									
No. 24		-7.5	-2.5	0	+5.0	+3.0			
No. 40	-1.0	+3.0	+3.0	0	+5.0	+2.0	+10.5	+13.0	+17.5
No. 64	-1.0	-3.5	-2.0	0	+2.0	+6.0	+22.0		
<i>Girls</i>									
No. 3		-7.0	-4.0	0	+0.5	+2.0			
No. 91	-1.0	-6.5	-1.0	0	+5.0	+10.5			
No. 159	-4.5	+1.5	+1.5	0	+2.5	+6.0	+8.0		
Weighted average	-1.8	-3.0	-0.3	0	+3.2	+5.4	+10.4	+13.0	+17.5

NOTE: For the number of pupils in each case, see Table A17.

TABLE A 20

Divergence of the average senior high school mark from that of pupils in the same school having an average mark of 73-77 in grade 8B of six junior high schools

SCHOOL	AVERAGE MARK IN GRADE 8B									
	58-62	63-67	68-72	73-77	78-82	83-87	88-92	93-97	98-100	
<i>Boys</i>										
No. 24		-8.9	-4.9	0	-3.7	+1.6				
No. 40	-2.7	+3.0	-0.1	0	+4.5	+1.0	+10.0	+13.0	+17.5	
No. 64	-0.3	-3.1	-2.7	0	+1.4	+7.7	+21.7			
<i>Girls</i>										
No. 3		-6.0	-3.0	0	+0.7	+2.0				
No. 91	-1.5	-4.2	+0.4	0	+6.9	+11.4				
No. 159	-5.0	+0.7	-2.5	0	+2.1	+5.2	+8.9			
Weighted average	-2.3	-2.4	-1.7	0	+2.5	+5.3	+10.8	+13.0	+17.5	

NOTE: For the number of pupils in each case, see Table A17.

By these tables we find that in the case of the 8B marks we may reasonably set the general significance of marks of 80, 85, 90, 95, and 100 at +3, +6, +9, +13, and +17 above that corresponding to the mark of 75. The significance of 60, 65, and 70 we set at -5, -3, and -1, considering not only the data of Tables A17, A18, A19, and A20, but also the data concerning low marks in Tables A22, A23, A24, and A25, and the general probabilities for such relations. We have then Table A21 for the computation of the scholarship mark for any pupil from his 8B mark, in case he did not advance beyond 8B.

DERIVATION OF HIGH SCHOOL MARKS FOR PUPILS NOT CONTINUING IN
SCHOOL BEYOND GRADE 8A, 7, OR 6

We proceed as for ninth grade and 8B marks, but now using marks for all the pupils in each of the elementary schools who received works marks in those schools and later attended a four-year high school but did not attend a junior high school.³ The facts appear in Tables A22, A23, A24, and A25. Table A26 is the resulting table used to assign scholarship marks in senior high school on the basis of the works marks in lower grades of pupils who did not continue to senior high school.

As will be seen from Table A25, we may reasonably set the general significance of works marks of 5 and 6 as +3.0 and +5.5 respectively (meaning thereby 3.0 more and 5.5 more than the high school mark obtained by a pupil who has a works mark of 4 in the elementary school in question). For works marks below 4 our material is very scant. We use -4 and -8 respectively for 3 and 2. If 1 ever occurs, we shall use -12 for it. If 7, 8, 9, or 10 occurs, we shall use +9, +12.5, +16, or +20, respectively.

³ For the purpose of this study, numerical values have been assigned to the letter marks used to rate scholarship in the elementary schools. They are referred to as "works marks" and have the following correspondence with the letter marks: A=60; A-, B+=50; B, B-=40; C+, C, C-=20; D=10; F=0.

TABLE A 21

Estimated score in Item 20 (average scholarship mark in senior high school) for a pupil attaining any average mark from 40 to 100 in grade 8B of any of six junior high schools

SCHOOL	AVERAGE MARK IN GRADE 8B													
	40	41	42	43	44	45	46	47	48	49	50	51	52	53
<i>Boys</i>														
No. 24	47	48	49	50	52	53	54	55	56	57	58	59	60	61
No. 40	41	42	43	44	46	47	48	49	50	51	52	53	54	55
No. 64	44	45	46	47	49	50	51	52	53	54	55	56	57	58
<i>Girls</i>														
No. 3	53	54	55	56	58	59	60	61	62	63	64	65	66	67
No. 91	48	49	50	51	53	54	55	56	57	58	59	60	61	62
No. 159	43	44	45	46	48	49	50	51	52	53	54	55	56	57
.	56	57	58	59	60	61	62	63	64	65	66	67	68	69
<i>Boys</i>														
No. 24	63	63	64	64	64	65	65	66	66	67	67	67	68	68
No. 40	57	57	58	58	58	59	59	60	60	61	61	61	62	62
No. 64	60	60	60	61	61	62	62	63	63	64	64	64	65	65
<i>Girls</i>														
No. 3	69	69	69	70	70	71	71	72	72	73	73	73	74	74
No. 91	64	64	64	65	65	66	66	67	67	68	68	68	69	69
No. 159	59	59	59	60	60	61	61	62	62	63	63	63	64	64

TABLE A 21 (continued)

SCHOOL	AVERAGE MARK IN GRADE 8B														
	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Boys															
No. 24	69	69	70	70	70	71	71	72	73	73	74	74	75	76	76
No. 40	63	63	64	64	64	65	65	66	67	67	68	68	69	70	70
No. 64	66	66	67	67	67	68	68	69	70	70	71	71	72	73	73
Girls															
No. 3	75	75	76	76	76	77	77	78	79	79	80	80	81	82	82
No. 91	70	70	71	71	71	72	72	73	74	74	75	75	76	77	77
No. 159	65	65	66	66	66	67	67	68	69	69	70	70	71	72	72
Boys															
No. 24	77	78	78	79	79	80	81	82	83	83	84	85	86	87	87
No. 40	71	72	72	73	73	74	75	76	77	77	78	79	80	81	81
No. 64	74	75	75	76	76	77	78	79	80	80	81	82	83	84	84
Girls															
No. 3	83	84	84	85	85	86	87	88	89	89	90	91	92	93	93
No. 91	78	79	79	80	80	81	82	83	84	84	85	86	87	88	88
No. 159	73	74	74	75	75	76	77	78	79	79	80	81	82	83	83

TABLE A 2 2

Median senior high school marks of pupils having median works marks of 2, 2½, 3, etc., in nine elementary schools. The number of pupils in each case is given in parentheses

SCHOOL	MEDIAN WORKS MARK IN GRADE 8A, 7, OR 6					
	2	2½	3	3½	4	5
<i>Boys</i>						
No. 11					68(11)	68(5)
No. 18					68(15)	70(3)
No. 27		69(1)			69(17)	74(4)
No. 39	51(4)		59(5)		64(47)	69(17)
No. 74					68.5(14)	70(4)
No. 147		63.5(4)			65(63)	69.5(24)
<i>Girls</i>						
No. 27					67(6)	70.5(10)
No. 39		68(1)		71.5(2)	75(25)	78(13)
No. 76					72(29)	74(21)
						76(11)
						80.5(12)

TABLE A 23

Average senior high school marks of pupils having average works marks of 2, 2½, 3, etc., in nine elementary schools

SCHOOL	2	2½	3	3½	4	5	5½	6
<i>Boys</i>								
No. 11					67.8	67.2		71.4
No. 18					67.9	70.0		71.0
No. 27					67.2	73.8		
No. 39	54.0	69.0		60.8	63.1	69.7	71.3	74.2
No. 74					67.8	70.5		72.6
No. 147		56.3			64.4	69.4		76.5
<i>Girls</i>								
No. 27					67.7	64.7		
No. 39		68.0	71.5		75.0	76.5		74.4
No. 76					71.6	73.4		77.8

NOTE: For number of pupils in each case, see Table A22.

TABLE A 24

Divergence of the median senior high school mark from that of pupils in the same school having a median works mark of 4 in nine elementary schools

SCHOOL	AVERAGE WORKS MARK IN GRADE 8A, 7, OR 6							
	2	2½	3	3½	4	5	5½	6
<i>Boys</i>								
No. 11					0	0		+2
No. 18					0	+2		+3
No. 27					0	+3		
No. 39	—13	0		—5	0	+5	+6	+10
No. 74					0	+1.5		+4.5
No. 147		—1.5			0	+4.5		+11.5
<i>Grrls</i>								
No. 27					0	+3.5		
No. 39		—7	—3.5		0	+3		+1
No. 76					0	+2		+8.5
Weighted average	—13	—2.5	—3.5	—5		+3.1	+6	+5.5

NOTE: For number of pupils in each case, see Table A22.

T A B L E A 2 5

Divergence of the average senior high school mark from that of pupils in the same school having an average works mark of 4 in nine elementary schools

SCHOOL	AVERAGE WORKS MARK IN GRADE 8A, 7, OR 6							
	2	2½	3	3½	4	5	5½	6
<i>Boys</i>								
No. 11					0	-0.6		+3.6
No. 18					0	+2.1		+3.1
No. 27		+1.8			0	+6.6		
No. 39	-9.1			-2.3	0	+6.6	+8.2	+11.1
No. 74					0	+2.7		+4.8
No. 147		-8.1			0	+5.0		+12.1
<i>Girls</i>								
No. 27					0	-3.0		
No. 39		-7.0	-3.5		0	+1.5		-0.6
No. 76					0	+1.8		+6.2
Weighted average	-9.1	-5.3	-3.5	-2.3	0	+2.8	+8.2	+5.4

NOTE: For number of pupils in each case, see Table A22.

TABLE A 26

Estimated score in Item 20 (average scholarship mark in senior high school) for a pupil attaining any average works mark from 1 to 6 in any of nine elementary schools

SCHOOL	AVERAGE WORKS MARK IN GRADE 8A, 7, OR 6									
	1	2	2½	3	3½	4	4½	5	5½	6
Boys										
No. 11	55	60	62	64	66	68	69	71	72	74
No. 18	55	60	62	64	66	68	69	71	72	74
No. 27	58	61	63	65	67	69	70	72	73	75
No. 39	54	56	58	60	62	64	65	67	68	70
No. 74	55	60	62	64	66	68	69	71	72	74
No. 147	52	57	59	61	63	65	66	68	69	71
Girls										
No. 27	54	59	61	63	65	67	68	70	71	73
No. 39	62	67	69	71	73	75	76	78	79	81
No. 76	59	64	66	68	70	72	73	75	76	78

The three sets of determinations described above could have been improved by using, as the bases from which to measure divergences, the average status over a wider range in place of the status of 4 for works marks and 73-77 for eighth and ninth-grade marks, and by attaching some weight to the divergences of individual schools in the form and slope of the regression line. But the time required to make and describe the calculations seemed to us likely to be better spent otherwise. For the purpose which they are to serve, the results from our simple treatment will be almost as good as those using the most probable form and slope for the regression line for each school.

If we could reasonably have assumed that the regression lines were all of the same form, we would have carried out the labor necessary to determine that form and the further labor necessary to determine the slope for each school. But that assumption did not seem justifiable by what is known about school marks in general, or by the correlation plots for these particular schools.

APPENDIX V

DERIVATION OF SCORE FOR SCHOOL PROGRESS FROM THE TIME OF THE TESTS UNTIL THE TIME OF LEAVING SCHOOL OR OF GRADUATION FROM SENIOR HIGH SCHOOL

BY ELLA WOODYARD

IN the case of the Grade Groups a score was given for the number of promotions attained after the tests in relation to the time spent in school after the tests. This score was 10 if the individual never failed of promotion during the period, except that if he graduated from high school without ever failing of promotion, he was scored 12; and if he continued to the last year of senior high school without any failure of promotion, he was scored 11. For one or more failures of promotion his score was decreased, and for one or more double promotions it was increased, as shown in Table A27(a).

If he stayed in school beyond graduation from high school, his score was determined by the number of promotions obtained and half-years spent in school from the time of the tests to the time of graduation from high school.

Our score is approximately the number of promotions the pupil would have obtained in 10 semesters of attendance at the rate he displayed from the time of the test till the time of leaving school or graduating from high school.

These scores are not strictly comparable, since the units are too coarse and are probably unequal. We know that extra promotions are, in general, easier the lower the grade, but we do not know how much easier. On the other hand, certain opportunities for accumulating extra promotions gradually by taking extra courses are greater in senior high school than in the grades below. Not being able to make allowances accurately, we simply keep approximately the same score for the same ratio of semesters of attendance to

promotions received, except for the special allowances noted and for the fact that we give estimated scores above zero for those who were not promoted at all.

It is probable that our procedures penalize the pupils who remain in school for many semesters in comparison with those who leave within a year or so. We shall later allow for this in the measure of educational success (Item 21), in which both grade reached and marks attained in senior high school are given weight.

In the case of the Age Groups, the score was given by Table A27(b), which has the effect of giving small bonuses to those who earn 8 or 9 promotions if they do so within 8 or 9 semesters. What was said above concerning imperfect comparability holds for this group also.

TABLE A 2 7

Derivation of score in Item 19 (school progress after the time of tests). The entry under the appropriate number of promotions received and on the line with the appropriate number of opportunities for promotion is the score

a) GRADE GROUPS

OPPORTU- NITIES FOR PROMOTION	PROMOTIONS RECEIVED									
	0	1	2	3	4	5	6	7	8	9
0	10									
1	5	10	20							
2	3	5	10	15	20					
3	2	4	7	10	13	17	20			
4	1	3	5	8	10	12	15	17	20	
5	0	2	4	6	8	10	12	14	16	20
6			3	5	7	8	10	12	14	16
7				4	6	7	9	10	12	14
8						6	8	9	11	13
9						5	7	8	10	12
10							6	7	9	10
11							5	6	8	9
12							5	6	7	8

TABLE A 2 7 (continued)

b) AGE GROUPS

OPPORTU- NITIES FOR PROMOTION	PROMOTIONS RECEIVED														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	
0	10														
1	5	10	20												
2	3	5	10	15	20										
3	2	4	7	10	13	17	20								
4	1	3	5	8	10	12	15	17	20						
5	0	2	4	6	8	10	12	14	16	20					
6			3	5	7	8	10	12	14	16					
7				4	6	7	9	10	12	14	16	18			
8						6	8	9	11	13	14	16			
9						5	7	8	10	12	13	14	16		
10							6	7	9	10	12	13	14	16	
11							5	6	8	9	10	12	13	14	
12							5	6	7	8	9	10	12	13	
13										6	8	9	10	12	
14											7	8	9	10	
15											6	7	8	9	
16											5	6	7	8	

APPENDIX VI

WAYS AND MEANS OF FOLLOWING INDIVIDUALS AND RECOVERING LOST CASES

BY IRVING LORGE

THE individual boys and girls had been tested in 1921 and in 1922. To these individuals, the tests represented a pleasant deviation from the normal routine of class work, but little more. Later, when the field workers came to an individual's home, they usually had to remind him of the tests he had taken and explain the purpose of the study.¹ If our population had had a selfish interest in cooperating, the inquiry might have been easier. No individual whose work career was followed had any reason to give the information save as a courtesy to the field worker making the inquiry. No compulsion was ever used to elicit information with reference to vocational success or failure. The fact that the careers have been recorded for nine-tenths of the group for nine years or more demonstrates the cooperation of the boys and girls (now men and women) in this study as well as the insight, perseverance, and intelligence of the field staff.

The ideal of the follow-up inquiry was to obtain work records from the individuals personally, either by direct visit, or personal correspondence, or by personal telephone conversation. This ideal was maintained throughout the study, though, on occasion, records were obtained from the person's parents or his siblings. The records were taken from related family members only when the accuracy of the report could be relied upon, or when the family's responses gave the best record available. To achieve this ideal of personal contact, field workers visited the homes of the boys and girls at inter-

¹ At the time of the tests some of them were told that they would be visited later, but probably few of them remembered it.

vals of from a year and a half to two years. If the person were still resident at the last recorded address, and if he were at home, the field worker briefly told the purpose of his visit (or reminded him of his previous visit) and asked questions, the answers to which would give the requisite information concerning employer, type of job, duration of employment, occupational level, interest in the work done, and the chances for promotion for each position held since the last visit (or held since leaving school). The greater the period of time elapsed between visits, or the greater the number of positions a person had held since the last visit, the greater the number of questions that had to be asked and answered.

The field worker usually saw boys at night after they had returned from their day's work. The boys, when the field worker came, may have been tired; they may have been cross; they may have felt they could not "see why you're bothering"; they may have had other appointments. Despite these psychological and physical barriers, the work records were obtained. The field worker recorded the answers to his questions in a diary. Later, the records were transcribed on the individual's cumulative record.² At the same time that the records were transcribed, the field worker made an entry for each person visited, whether seen or not, recording the visit and any other relevant information. The diary was kept to record information of special interest concerning each person, whenever this information did not constitute part of a work record. The procedure was essentially the same for each person visited, but with subtle differences in individual approach and adjustment.

Work records were also obtained by mail and by telephone. The follow-up by letter was used with persons who had been seen previously, or with persons who lived at some distance from the city, or with persons who were not often at home. A form with blanks to be filled in with the needed information was sent under cover of an explanatory letter which reminded the person of the purpose of the vocational guidance inquiry and of the last visit. The follow-up

² A sample of a follow-up record card is shown in Appendix VIII.

by telephone was conducted, in most respects, in the same way as a field visit. Provided a personal visit had already been made, the telephone conversation was usually an efficient method of obtaining records. The field worker, if he made a visit and saw the boy, or telephoned and spoke to him, usually obtained the work record. But often a visit to the last recorded address brought information that the individual or his family unit had moved. Families in New York City move from residence to residence frequently. These frequent moves, fortunately, have been usually within the area of New York City and its environs, though some families have moved to other states of the United States, and to other countries.

When the field worker learned that an individual and his family unit had moved, the most difficult part of his work began, for the new address of the person had to be ascertained. The problem of getting new addresses is not an easy one in a large city. Some people keep their personal affairs to themselves and are indifferent to those of others. Neighbors sometimes constitute themselves a sort of protective group to forestall dunning by instalment and other bill collectors. People may move stealthily by night to avoid payment of bills and rents. People may move without leaving addresses with janitors or with neighbors, and without giving forwarding addresses to the local post office. Whenever a member of our group moved, however, it became the field worker's task to relocate the "lost" person.

The first step in searching for a new address was a careful apartment-to-apartment inquiry in the course of which possible friends and neighbors were seen in the hope of getting the new address for the lost person. When this canvass failed, inquiry was made of the janitor and of the various local retail storekeepers, and search was carried on from house to house in the immediate neighborhood. In many instances, careful field survey located the new individual at a definite address or brought information which enabled the field worker to find the individual. As a last resort, the card was turned over to a special field investigator for a "trace." On this tracer card

were recorded the missing person's name, birth date, and other identifying information. The date and the result of the last field visit were recorded. This tracer card insured efficiency in using each possible source of obtaining a new address and prevented needless duplication of effort.

The sources available to the field worker were:

1. The records of the permanent school census
2. The transcripts from the Social Service Exchange
3. The telephone directory
4. The records of marriages
5. The records of the motor vehicle bureau
6. Previous and current employers' personnel records
7. Registered letters with requests for return receipts
8. Chance information from classmates and friends
9. Confidential records

1. The Bureau of School Census of the Board of Education records, at intervals, all persons of school age on a family card. For each child of school age, it reports birth date and the school attended at the time of the census. The trace consisted of searching for the surname (and variant spellings of it) and ascertaining the school at which younger children were reported in attendance. When the school at which a younger sibling attended was ascertained, the field worker went to that school and traced through the transfer records for the new address, or for the school to which the sibling had been transferred. In this search, the Inquiry had special permission from the Board of Education to use the records.

2. The Social Service Exchange is an organization which acts as a clearing-house for all cooperating social agencies to prevent duplication of effort. Each family unit that is served by any cooperating social agency is filed by surname, and by street address. The Social Service Exchange cooperated by sending us, for such persons as could be identified by the Exchange, a transcript of the agencies

that had an interest in the family unit with the initial date of such interest. Since our policy was to keep all records confidential, the Exchange made a special provision whereby none of the identifying information, or the request for information, was ever incorporated into their registry. When the transcript from the Exchange was received, the interested social agencies were interviewed for the last known address of the missing individual or his family unit.

3. A search was made of each telephone directory as it was issued for listings of telephones for any temporarily lost person or related families. By telephone conversation and by field visit, these clues were utilized to locate the person.

4. The records of the marriage bureau list the names and addresses of the contracting parties, their parents, and the witnesses of the ceremony. At regular times, the records of the Bureau of Marriage Licenses were searched for the records of marriage of lost persons of the study, their siblings, or their parents. The records of marriage, if discovered, gave new addresses, or, at least, new clues to the whereabouts of the missing individuals.

5. The Bureau of Motor Vehicles lists each licensed operator, chauffeur, or owner of an automobile. For a fee of five cents for each name searched, the bureau sends information for such licensed persons as they can identify. This information gives the address of the person at the time the license was issued, and in addition, for chauffeurs, may give the name and address of the employer for whom the person was working.

6. Whenever a person had been seen and a record obtained some time previous to his removal, the last recorded employer was interviewed to obtain the present address if the individual was still employed, or if not, the last known address.

7. The Post Office Department by law cannot reveal forwarding addresses. Whenever all other clues failed, a registered letter asking for the work record was addressed to the last known address of the individual with a request to the Post Office Department for a return receipt. If such a registered letter was returned by the post

office, it was clear that the Directory Division had exhausted its resources in an attempt to deliver the letter.

8. Sometimes, when all sources had failed to bring to light a new address for a lost person, a friend or a classmate gave information which, after assiduous detective work, enabled us to locate the sought-after person.

9. We had access also to other records which must be kept confidential in order to protect the individuals and institutions concerned.

Each possible source was exhausted in the hope of relocating a temporarily lost individual. No clue was left without completely exhausting it. Many of the records obtained in this study represent dozens of hours in search for new addresses. The search for a person is not abandoned unless his death certificate is on our file.

APPENDIX VII

A. THE RELIABILITY OF EMPLOYEES' RECORDS OF EMPLOYMENT

BY ELSIE O. BREGMAN

IN order to check the reliability of the data used in the major part of the vocational guidance inquiry, we have obtained, directly from the employers, the employment histories of a sample of our cases.

The data used throughout the main study are based upon work histories as related at periodic intervals to our investigators by the subjects of the study themselves. It was the impression of the investigators that these reports of personal history were for the most part honestly given and with reasonable accuracy. Faulty memory seemed to be the most likely cause of such errors as might exist. Only relatively rarely did the interviewers have reason to suspect that histories might be distorted through indifference, negligence, or deliberate misstatement. It was, however, desirable to determine how large an error our data actually were subject to, by reason of these factors.

The facts of employment existed, of course, in the records of the employers themselves and might be available if the name of the employer were known and the firm were still in business. The names of employers, although not always taken by the investigator as a routine part of the history, especially in the first years of the follow-up, appeared on a great many of our record cards. We have accordingly obtained histories for a sample of our cases from the employers and have compared them with the accounts given for the same jobs by the subjects of our study.

SELECTION OF SAMPLE HISTORIES

The sample was selected as follows. Early in January, 1932, there were in our files the record cards of 1,068 cases, complete as of October, 1930, or later. These cards we reviewed, and selected from them all those on which were recorded the names of at least two employers for whom the individual had worked recently enough, or for a long enough period of time, or both, to make it seem likely that records giving the details of employment would still be available; or, failing records, that the individual would be remembered by the employer.

Current employers for whom our cases were still at work at the time of the last interview were excepted from this selection. It seemed possible that an inquiry concerning an employee who was still on the job might embarrass the employee, and we wished to avoid any such possibility. We also excluded cases in which certain large corporations were employers, since these organizations maintain fixed schedules of pay and promotion which are fairly well known or easily ascertained. The likelihood of error of report from the employees of these organizations seemed small. Also, whenever a choice of employers was possible, the smaller and less well-known firm was chosen.

It is possible that the cases in which the names of employers were not given contain, for that very reason, a disproportionate number of the less reliable histories. If this is so, then their necessary exclusion from our sample should be offset by our policy of likewise eliminating the cases that were probably the most reliable—those of the employees of the larger firms and corporations.

We found 253 cases for each of which there were two employment records, according to the requirements set. This made a total of 506 employers. Of these, we found, by means of the "Winter 1931-32" telephone directories, 356 employers who were still in business, at least in the winter of 1931, when the directories were printed. We had then the possibility of verifying the records for two jobs each for 178 of our cases.

The employment records were obtained by personal interview. The writer called on each firm, introduced herself and the project briefly, and asked for the employment history of the former employee, covering the following points:¹

1. Exact dates of employment and termination of employment
2. Initial salary and amounts and dates of increases and cuts in salary
3. Exact nature of work performed

Without exception, where the information was available, it was readily placed at our disposal by the employing firm. In most cases, it was obtained from written records, either the employee's record card or sheet, or directly from the payrolls of the company. Where these were not available, it was sometimes possible to obtain one or more of the desired items of information from the personal recollection of the employer or a member of the employing firm. In many such cases exact dates of employment could be fixed by their relation to other events in the history of the firm. The employer was almost always quite definite as to the nature of the work performed. Often he was equally definite as to salary, or could venture a close approximation. Occasionally, although the fact of employment was verified, a partial history only was obtained since definite information as to earnings or dates of employment was no longer available.

For 40 cases, we have no record at all, either because the firm had ceased to exist at the time of our visit, or because the necessary records no longer existed, and no one in the firm could recall the employee in question. In one case, both employers named by our case, a girl, were fictitious, or else the girl had worked under an assumed name. Employment records in both organizations were

¹ An estimate of competence was also obtained whenever the record gave such information and when the interview was with an individual who had had personal supervision or contact with the employee in question. The estimate was on a rough scale of satisfactory, exceptionally good, or not quite up to the average in ability.

complete but the girl's name was not found among them. This was the only case in which this happened.

TABLE A 28

Number of work histories obtained from employers

	BOYS	GIRLS	TOTAL
Complete record from both employers	52	48	100
Complete record from one employer only	9	19	28
Partial record from one employer and full record from the other employer	3	5	8
Partial record from both employers	1	1	2
No record from either employer	25	15	40
<i>Total</i>	<i>90</i>	<i>88</i>	<i>178</i>

Table A28 lists the number of full and partial records collected. As may be seen from this table, we have complete records from the employers for each of two jobs for 100 individuals, full records from at least one employer for 28 additional individuals, and partial records from either one employer or both for 10 more.

We have compared these employment histories with the reports obtained by our investigators for each job separately, and for the total period covered by the two jobs, although the two do not always follow in succession one upon the other, with respect to the following:

1. Duration of employment
2. Average weekly earnings
3. Nature of work performed

In so doing we have studied the records of the boys and girls separately. For clearness in presentation we have called the earlier of the two jobs held by each individual, Job A, the later, Job B. In comparing the records on the separate jobs we have used all the cases available. In comparisons with combined record—Job A plus Job B—we have used only the two groups of 52 boys and 48 girls for whom there were full data from the employers on both jobs.

DURATION OF EMPLOYMENT

In Table A29 is shown the average length of stay on each of the two jobs—and on both jobs combined—as obtained from our parallel sources of information. Standard deviations as well as means are

TABLE A 29

Average duration of employment in weeks as reported by employers and employees

	EMPLOYEE		EMPLOYER		DIFFERENCE BETWEEN MEANS *
	Mean	SD	Mean	SD	
Boys:					
Job A (n=59)	74.7	57.1	77.9	64.3	- 3.2
Job B (n=56)	75.2	54.4	65.4	51.8	9.8
Girls:					
Job A (n=55)	84.3	55.5	77.2	57.6	7.1
Job B (n=64)	74.9	50.5	66.7	44.3	8.2
Boys:					
Jobs A + B (n=52)	147.9	74.6	133.7	72.8	14.2
Girls:					
Jobs A + B (n=48)	154.6	68.6	141.7	60.3	12.9

* Employee's report minus employer's report.

reported. The differences between the means are also listed, the means of the employers' series having, in each instance, been subtracted from the means of the employees. From inspection of this table, we learn that the average length of stay on a single job, as reported by the members of our sample, is approximately a year and a half. In the case of the boys on Job A this is less by three weeks than the average for the same job reported by employers. For Job B the boys' reports exceed the employers' reports, the average difference being 9.8 weeks. The girls' reports on both jobs

are in excess of their employers' reports, the average difference being 7 and 8 weeks respectively. Although these differences seem to indicate a tendency in our subjects to overstate the actual period of employment, they are relatively small as compared with the wide range of employment periods represented in the sample. The data include records for individuals employed for less than two months, at one extreme, and for as long as six years, at the other. The standard deviations of the several distributions, it will be noted, vary between 44 and 64 weeks.

When the records for the two periods of employment are combined, the tenure amounts to approximately three years for both boys and girls. The employers' reports indicate somewhat shorter total periods of employment. The differences are 14.2 and 12.9 weeks in favor of the employees' reports for the boys and girls respectively.

We have correlated the employers' with the employees' reports for each job separately, and for the total period covered by both jobs, with the following results:

	<i>r</i>	<i>n</i>
<i>Boys</i>		
Job A	.90	59
Job B	.89	56
<i>Girls</i>		
Job A	.92	55
Job B	.87	64
<i>Boys</i>		
Jobs A + B	.87	52
<i>Girls</i>		
Jobs A + B	.93	48

Clearly the reports from employer and employee are in close agreement. The correlation coefficients for the boys are .90 and .89

on Jobs A and B respectively, .87 when time on both jobs is tallied. For the girls, the coefficients are .92 and .87 for the separate jobs, .93 for the two jobs together.

EARNINGS

We have compared the data as to earnings in terms of average salary per week for the term of employment. In Table A30 will be found the means and standard deviations of the several distributions and the differences between the means of the employers' and employees' reports.

The correlation coefficients, representing the agreement of the employers' with the employees' reports, are as follows:

	<i>r</i>	<i>n</i>
<i>Boys</i>		
Job A	.88	60
Job B	.90	56
<i>Girls</i>		
Job A	.84	56
Job B	.75	64
<i>Boys</i>		
Jobs A + B	.86	52
<i>Girls</i>		
Jobs A + B	.71	48

WORK LEVEL

The reports of employers as to nature of work performed were coded in accordance with the scheme used throughout the main inquiry. In comparing the two series of data, we found it possible to disregard the work classifications, clerical, mechanical, and professional, and to confine our comparison to work level only, inasmuch as there were only two instances in which the reports of employer

TABLE A 3 0

Average weekly salary as reported by employers and employees

	EMPLOYEE		EMPLOYER		DIFFERENCE BETWEEN MEANS *
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	
<i>Boys:</i>					
Job A (n=60)	\$19.86	\$7.78	\$18.56	\$7.56	\$1.30
Job B (n=56)	24.82	10.04	22.26	8.81	2.56
<i>Girls:</i>					
Job A (n=56)	18.52	4.33	17.72	3.81	.80
Job B (n=64)	21.61	4.41	20.33	4.48	1.28
<i>Boys:</i>					
Jobs A + B (n=52)	22.00	7.30	20.04	5.92	1.96
<i>Girls:</i>					
Jobs A + B (n=48)	20.85	3.70	19.83	3.28	1.00

* Employee's report minus employer's report.

TABLE A 3 1

Average work level as reported by employers and employees

	EMPLOYEE		EMPLOYER		DIFFERENCE BETWEEN MEANS*
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	
<i>Boys</i>					
Job A (n=63)	2.1	.52	1.8	.58	.3
Job B (n=57)	2.4	.62	2.2	.60	.2
<i>Girls</i>					
Job A (n=59)	2.4	.61	2.2	.56	.2
Job B (n=64)	2.6	.61	2.3	.51	.3
<i>Boys</i>					
Jobs A + B (n=52)	2.2	.46	1.9	.51	.3
<i>Girls</i>					
Jobs A + B (n=48)	2.5	.53	2.2	.50	.3

* Employee's report minus employer's report.

and employee were at variance so far as the work classification was concerned.² Table A31 reports the means and standard deviations computed from the average work level for each individual on each job and where possible for each individual on both jobs.

The correlation coefficients for work level, representing the agreement of employers' records with those of employees, are as follows:

	<i>r</i>	<i>n</i>
<i>Boys</i>		
Job A	.54	63
Job B	.58	57
<i>Girls</i>		
Job A	.62	59
Job B	.65	64
<i>Boys</i>		
Jobs A + B	.57	52
<i>Girls</i>		
Jobs A + B	.67	48

How much of the error may be attributed to the subject in misleading the investigator as to the dignity and responsibility of his job, and how much to the investigator in translating the reports into a quantitative scale is an open question.

We find from inspection of the distributions of the differences between the employee-employer reports that in 62 per cent (150 of the 243 work records verified) there is actually no difference (see Table A32). The employer and employee made identical reports. Of the remaining 38 per cent of the reports, 32 per cent were in excess of the work level indicated by the employer. In the opinion of the writer, most of these cases really made out their jobs to be

² One girl who had been actually wrapping packages and pasting labels reported that she was working as a secretary-stenographer. One boy, for whom the employer's records showed employment only as an apprentice and helper electrician, had reported, for this job, a period of clerical work preceding work as an apprentice.

T A B L E A 3 2

Reports of employees and employers classified and compared for frequency of agreement, understatement, and overstatement

	DURATION OF EMPLOYMENT			AVERAGE WEEKLY SALARY			AVERAGE WORK LEVEL					
	Em- ployee's state- ment agrees with em- ployer's to within 2 weeks	Em- ployee under- states by 2 weeks or more	Em- ployee over- states by 2 weeks or more	Total num- ber of re- ports	Em- ployee's state- ment agrees with em- ployer's within \$1.00	Em- ployee under- states by \$1.00 or more	Em- ployee over- states by \$1.00 or more	Em- ployee agrees with em- ployer to within 1/10th of a step	Em- ployee under- states by 1/10th of a step or more	Em- ployee over- states by 1/10th of a step or more	Total num- ber of re- ports	
Boys												
Job A	12	17	30	59	19	15	26	60	37	4	22	63
Job B	11	10	35	56	15	10	31	56	35	4	18	57
Girls												
Job A	8	13	34	55	24	9	23	56	40	5	14	59
Job B	15	15	34	64	26	10	28	64	38	2	24	64
Total	46	55	133	234	84	44	108	236	150	15	78	243
Per cent	19	24	57	100	35	19	46	100	62	6	32	100

more important than they actually were. Inspection of the original records in each case of discrepancy seemed to bear this out. And, otherwise, a more even distribution of the differences was to be expected.

THE DIRECTION OF THE DIVERGENCES GENERALLY

It is of interest to inquire as well into the characteristic direction of the deviations for the other items, duration of employment and earnings. We have seen that the correspondence between the two series of reports, with respect to these items, is close. But we may still inquire as to whether there is a characteristic tendency to overstate or understate even by small amounts, in these matters of personal history.

Examination of Tables A29, A30, and A31, in which the means and the differences between the means of the employers' and employees' reports appear, disclose a consistent, if slight, tendency to overstatement by the employee. The differences, with one exception only, are positive. This tendency is even more clearly apparent from an examination of Table A32. This table summarizes, for each of the items of work history, the number of times in which the employees' reports showed no deviation from the employers' reports, the number of times in which they exceeded the employers' reports, and the number of times in which they were understated. The preponderance of overstatement by the employees for all three factors of work history is marked.

The understatements probably represent true cases of forgetting. An equal proportion of overstatements may perhaps be ascribed to the same cause, although at this psychoanalysts may cavil. Beyond this amount, the overstatements seem to be a nice illustration of wishful thinking in the realm of vocational history.

SUMMARY AND CONCLUSIONS

In order to test the reliability of the vocational histories reported by the subjects of the vocational guidance inquiry, we have obtained

the employment records for a number of cases directly from their employers.

We have obtained complete information as to tenure, earnings, and work performed on two jobs each, for 100 cases, complete information for one job for 28 cases, and partial data on one or both jobs for 10 cases. So far as we can judge, these cases should be a representative sample, with respect to reliability of report, of the total number of cases studied in the main inquiry.

We have compared the records obtained from the employers with the reports given for the same jobs by the employees.

We find the two series of data to correspond very closely when checked for duration of employment and earnings. The reports are practically identical with respect to work classification, and reasonably close with respect to work level. Differences, when they appear, are most frequently slight exaggerations by the employees of income, tenure, and work level.

B. THE RELIABILITY OF EMPLOYMENT DATA REPORTED BY EMPLOYEES FOR THEIR CUR- RENT JOBS

BY ELSIE O. BREGMAN

WE HAVE been able to obtain from employers the employment records for the current jobs of 61 subjects of the vocational guidance inquiry. We have compared these records with the reports made to us for the same jobs by the subjects themselves with respect to date of employment, weekly salary, and average work level.

The records were obtained by mail. A letter which set forth briefly the nature of the inquiry, named the employee, and asked for the employment history was addressed to each employer. It was accompanied by a blank form which allowed for the entry of the salient points in the history—date of employment, nature of

work performed, initial and present salary, dates and amounts of raises or cuts in salary, dates of promotion, and an estimate of competence.

Letters were sent to the present employers—as indicated at time of last interview—of 76 cases. Returns were received from 61.

The inquiry was made in April, 1932. The 76 cases were originally selected by reviewing the records in our files at that time of all individuals who had been interviewed within six months and who were employed at the time of interview. From these we selected the cases which showed employment at the present job for at last three years prior to April, 1932,³ having eliminated first all cases for which we had already obtained an employer's report on an earlier job. We also excluded bookkeepers as subjects of inquiry, since in most organizations, as we had learned from the first study of reliability of employers' records, it would be the bookkeeper himself from whom the employment history would be obtained. And, as in the earlier study, we likewise did not include the employees of certain large organizations whose schedules of pay and promotion were well known and from whose employees there was, in consequence, little likelihood of error of report.

The returns from the 61 employers were not all complete. Fourteen employers did not report salary data; four were unable to fix the initial date of employment exactly. In two cases we were unable to establish the exact work level from the report which we received.

The 61 cases represent a very stable group of employees. The median period of employment—up to the time of last interview—is 260 weeks, five years. The middle half of the group have been at their present jobs between 208 and 308 weeks, four years to six years, roughly.

Comparing the initial date of employment reported to us by the employees with the dates given by the employers, we find the mean difference between the two sets of reports to be 1.48 weeks, the SD

³ By an inadvertence one case showing two years and one-half of employment at the current job was included.

TABLE A 33

Reliability of the reports for their current jobs given by a group of stable employees. Median period of employment = 5 years. PE = 50 weeks. Number of reports: salary, 47; work level, 59; initial date of employment, 57

	WEEKLY SALARY		WORK LEVEL		INITIAL DATE OF EMPLOYMENT	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Employee's report	\$23.51	4.96	2.50	.55		
Employer's report	23.19	4.55	2.46	.55		
Difference	.32	2.35	.04	.241	1.48 weeks	24.37 weeks
r	.88(PE .02)		.90(PE.02)			

of the difference 24.37 weeks. There are reports from both sources for 57 cases. Our subjects have reported the date of employment both as earlier and later than it was in fact. The average difference is negligible. For 63 per cent of the cases, the actual difference was less than six weeks, either way. With one exception all the cases were still employed in April, 1932.

The average weekly salary for the 47 cases for whom we have this information is, according to their own reports, \$23.51, SD \$4.96.⁴ According to the employers it was \$23.19, SD \$4.55. The difference is \$.32, SD \$2.35. The correlation between the two series of reports on salary is represented by the coefficient .88.

A similar relationship holds for the two sets of reports on work level. The coefficient of correlation is .90. The mean of the employees' reports of work level is 2.50, SD .55; the mean of the employers' report is 2.46, SD .55. The difference is .04, SD .241.

Table A33 summarizes the facts set forth in the preceding paragraphs.

⁴ Computed up to the time of last interview. Average work level has been computed for the same period.

C. THE INFLUENCE OF THE UNRELIABILITY OF EMPLOYEES' REPORTS UPON THE RESULTS STATED IN CHAPTER VI AND IN APPENDIX XIV

BY E. L. THORNDIKE

A TENDENCY on the part of workers to overstate salaries and length of employment influences our results in two ways. First, in the descriptions of status in Appendix XIV, the tables showing earnings and percentage of time unemployed as reported by the workers

TABLE A 3 4

Correlations between the overstatement of salaries, length of jobs, and level of work (measured in each case by employee's report minus employer's report) and Items 3, 9, 5, and 6 (clerical intelligence, arithmetic plus reading, and mechanical adroitness). n = number of reports

	OVERSTATE- MENT OF SALARY	OVERSTATE- MENT OF LENGTH OF JOB	OVERSTATE- MENT OF LEVEL OF WORK	APPROXI- MATE PE
Item 3 ($n=100$)	.18	-.11	-.12	.07
Item 9 ($n=100$)	-.12	.03	-.14	.07
Item 5 ($n=52$)	.19	-.11	.20	.10
Item 6 ($n=48$)	.07	-.21	-.07	.10

need correction, as stated there. Second, the correlations between earnings and level of work and various other facts would need correction, if the tendencies to overstate salaries, length of employment, and level of work were correlated with these other facts. For example, if the more intelligent children overstated salaries and length of jobs less than the duller ones, our correlations between intelligence and earnings at clerical work would be, in so far forth, too low and would have to be corrected upward. If the more intelligent overstated salaries and length of jobs more than the

duller ones, our correlations would be, in so far forth, too high, and would have to be corrected downward. If, however, the correlations between the tendency to overstate salaries, employment, and level of work correlate at or near zero with our scores in clerical intelligence, abstract intelligence, and mechanical adroitness (Items 3, 9, and 5 or 6), the correlations of earnings and level of job at ages 20.0 to 22.0 and 18.0 to 20.0 (Items 22, 23, 30, and 31) therewith will require no correction.

The latter is the case. The correlations of the tendency to overstate salaries and length of job with our Items 3 and 9 average $-.005$, and with Item 5 (or 6), $-.015$. The details are presented in Table A34. The correlations of the tendency to overstate the level of the work with Items 3 and 9 average $-.130$, and with Item 5 (or 6), $+.065$. The average of all is $-.02$. The details are given in Table A34.⁵

⁵ The correlations of the tendency to overstate salaries, etc., with school marks for scholarship and conduct up to the time of the tests (Items 12 and 11) are of some interest, though we do not recommend the use of either in predicting vocational success. Taken at their face-value they show that good marks in scholarship go slightly with overstatement (Av. $-.03$), and good marks in school conduct with understatement (Av. $-.08$). But the difference may well be due to chance. The average for both is practically zero ($-.026$).

APPENDIX VIII

SAMPLES OF RECORD CARDS

ONE of the original school data cards and a follow-up card are reproduced on pages 196 and 197. Different colored cards were used for boys and girls, and certain variations in the cards for different ages occurred. The follow-up card contained spaces for both school and work data and sufficed for subjects continuing in day school, at work, or working while attending school, thus making it unnecessary for the field worker to carry several kinds of cards.

Samples of all record cards, form letters, etc., used in the vocational guidance inquiry are available through Teachers College, Columbia University, and the Welfare Council of New York City.

a	b	c	d	e	f	g	h	A	B	C	D	a	b	c	d	e	a	b	c	1	2	3	4	5							
1. GRADUATION												3. SECTIONING					4. EFFORT					5. PHYSICAL					8b 14 BOYS Age: 14.0 - 14.9				
INDIVIDUAL VOCATIONAL GUIDANCE REPORT CARD																															
INSTITUTE OF EDUCATIONAL RESEARCH, TEACHERS COLLEGE, NEW YORK CITY																															
Name												School												7b Name of							
First												Last												7a Grade							
Address												Parent's Name												6b Father's Occupation							
Age												years.												6a Date of birth							
on test date												was												6a Date of birth							

Decile	Toops Clerical	Thorndike Clerical	Stenquist Assembly	I. E. R. Assembly	Arith. Read.	Height	Weight	Half Year Gains	Total Works	Total Conduct	Av. Term Absences	Decile
10	45—65	31—39	73—90		92—111	66—71	131—189	—1, + 2	44—60	56—60	0—1	10
9	39—44	29—30	63—72		84—91	65	121—130	—2	40—43	52—55	2	9
8	35—38	26—28	56—62		77—83	64	114—120	—	37—39	49—51	3	8
7	31—34	24—25	51—55		70—76	.63	109—113	—3	35—36	47—48	4—5	7
6	27—30	22—23	45—50		65—69	61—62	104—108	—4	33—34	45—46	6	6
5	24—26	20—21	39—44		60—64	60	99—103	—5	31—32	42—44	7	5
4	20—23	18—19	34—38		56—59	59	93—98	—	29—30	39—41	8—9	4
3	15—19	16—17	28—33		50—55	58	89—92	—6	26—28	36—38	10—12	3
2	10—14	13—15	20—27		41—49	57	83—88	—7	22—25	29—35	13—16	2
1	0—9	0—12	0—19		21—40	53—56	59—82	—8, —12	9—21	0—28	17—42	1

Decile	Toops Clerical	Thorndike Clerical	Stenquist Assembly	I. E. R. Assembly	Arith. Read.	Height	Weight	Half Year Gains	Total Works	Total Conduct	Av. Term Absences	Decile
Remarks:												

APPENDIX IX

A. DERIVATION OF ITEMS OF VOCATIONAL HISTORY AT AGES 20.0 TO 22.0 AND 18.0 TO 20.0

FOR a summary of the vocational record a card like that shown on page 199 was used, with the following directions.

Use boxes 22 to 37 for computed entries. Use boxes 27 inf. a, 28 inf. a, and 29 inf. a, and the boxes below them for estimated or inferred entries. Use the space above boxes 22 to 37, etc., for entering the essential data whence the computations are made, and for explanatory notes.

The measures to be entered in boxes 22 to 37 are as follows:

- Box 22. Average earnings per year, at age 20.0 to 22.0, to nearest dollar
- Box 23. Average level per year, at age 20.0 to 22.0, to nearest tenth
- Box 24. Average interest per year, at age 20.0 to 22.0, to nearest tenth
- Box 25. Percentage of time employed, at age 20.0 to 22.0, to nearest percent
- Box 26. Number of changes of employer per two years, at age 20.0 to 22.0
- Box 27. 40 plus average weekly earnings (in dollars) at C work (age 20.0 to 22.0) minus average weekly earnings at M work. Compute to nearest dollar
- Box 28. 6.0 plus average level at C work (age 20.0 to 22.0) minus average level at M work
- Box 29. 6.0 plus average interest at C work (age 20.0 to 22.0) minus average interest at M work
- Box 30. Same as in 22 but for age 18.0 to 20.0
- Box 31. Same as in 23 but for age 18.0 to 20.0
- Box 32. Same as in 24 but for age 18.0 to 20.0
- Box 33. Same as in 25 but for age 18.0 to 20.0

Box 34. Same as in 26 but for age 18.0 to 20.0

Box 35. Same as in 27 but for age 18.0 to 20.0

Box 36. Same as in 28 but for age 18.0 to 20.0

Box 37. Same as in 29 but for age 18.0 to 20.0

In computing these measures of vocational status the following rules were observed.

In the case of a girl who marries during the period 18.0 to 20.0, do not compute earnings, level, etc., for age 18.0 to 20.0 unless she was at work or seeking work for one year or more of the period. In the case of a girl who marries during the period 20.0 to 22.0, do not compute earnings, level, etc., for age 20.0 to 22.0, unless she was at work or seeking work for one year or more of the period.

In computing 22 and 30: If the person was in school for part of the period, assume that he would have earned during that time at the rate at which he earned when at work or seeking work.

In computing 27 and 35: Average earnings per week at C work are obtained by dividing total earnings at C work by the number of weeks of C work plus the number of weeks of time seeking C work. Similarly for average weekly earnings at M work. In allotting unemployed time as seeking C work and seeking M work, as a rule divide each period of unemployment 50 per cent to the kind of work immediately preceding it and 50 per cent to the kind of work immediately following it. But if some different division seems more reasonable in any individual case, this rule may be set aside.

Above the box labeled total earnings, the value "percent C" is to be entered. This is the percent of all working time during which the individual did clerical work. P (professional) or CM (mixed) time is allotted half to clerical and half to mechanical in computing this figure.

All averages for boxes 23, 24, 31, and 32 are to be weighted by the number of weeks. Boxes 27, 28, and 29 are to be filled only if the individual worked at both C and M jobs during the 20.0 to 22.0 period. Boxes 35, 36, and 37 are to be filled only if he worked at

TABLE A 3 5

Data for estimating the probable earnings per year at age 20.0 to 22.0 from the actual earnings at age 18.0 to 20.0 and vice versa. The actual annual earnings in hundreds of dollars of the 10th percentile, 20th percentile, 30th percentile, etc., at the two periods in the case of boys working at M, boys working at C, girls working at M, and girls working at C.

n=approximately 100 in each case

PER- CENTILE	M BOYS		C BOYS		M GIRLS		C GIRLS	
	18-20	20-22	18-20	20-22	18-20	20-22	18-20	20-22
10	7.0	8.3	6.1	9.0	4.9	4.5	6.7	8.5
20	8.6	10.2	7.9	11.0	6.1	6.6	7.9	9.4
30	9.7	11.2	8.8	12.0	7.6	7.7	8.6	10.2
40	10.4	12.5	9.6	12.8	8.0	8.7	9.2	11.1
50	11.4	13.7	10.2	13.3	8.4	9.4	9.8	11.9
60	12.2	15.2	10.9	14.0	8.9	10.1	10.4	12.6
70	13.4	16.8	12.0	15.3	9.5	10.8	11.0	13.3
80	14.9	18.1	13.1	17.3	10.3	11.8	12.1	14.0
90	17.5	20.5	15.3	21.5	11.8	13.0	13.4	15.0

both C and M jobs during the 18.0 to 20.0 period. If a period of unemployment is preceded and followed by C work alone or by M work alone, allot the unemployment all to C or all to M. If a period of unemployment is preceded by one of C or M and followed by the other, allot half of it to each. To obtain the average weekly earnings at C, the sum of C earnings is to be divided by the total weeks working at C plus the unemployed weeks allotted to C. Similarly for the average weekly earnings at M.

The boxes 27 inf. b, 28 inf. b, 29 inf. b, and those below them will not be used at present. But boxes inf. a and those below them will be used in cases where the objective data do justify some inference. The rules for making inferences are stated below.

If the individual worked at C and P or at C and CM, the P or CM is taken as M for the C-minus-M comparison. Results are then recorded in boxes 27, 28, and 29 inf. a. Similarly if he worked

at M and P or M and CM, the P or CM is taken as C for purposes of inference. If he worked at all three, the direct comparisons are made, and the inferences ignored.

METHOD OF INFERRING EARNINGS, LEVEL OF WORK, AND INTEREST,
AT CLERICAL WORK AND AT MECHANICAL WORK

The average yearly earnings at age 20.0 to 22.0 of the 10th, 20th, 30th, 40th, 50th, 60th, 70th, and 80th percentile boys who did 100-per-cent clerical work were plotted in relation to the earnings of the corresponding percentiles at age 18.0 to 20.0. The same was done for the 10th, 20th, 30th, 40th, 50th, 60th, 70th, and 80th percentile girls who did 100-per-cent clerical work. The same was done for boys and girls doing 100-per-cent mechanical work. In each of the four groups, about a hundred cases were taken as a sample. Table A35 presents the facts for both clerical and mechanical workers.

The four relation lines resulting are shown on page 206. The relation, earnings at age 20.0 to 22.0 = $1.25 \times$ earnings at age 18.0 to 20.0, fits any one of them over most of its course sufficiently well for our purpose. So we infer average weekly earnings at C or at M by the formula:

$$E \text{ at age } 20.0 \text{ to } 22.0 = 1.25 \times E \text{ at age } 18.0 \text{ to } 20.0$$

If an individual has both C and M records at age 18.0 to 20.0 but not at age 20.0 to 22.0, or at age 20.0 to 22.0 but not at age 18.0 to 20.0, or has all C at one period and all M at the other, we may use this equation to infer C-minus-M measures.

The level scores at age 20.0 to 22.0 for somewhat larger samples (total 586) were plotted in relation to those at age 18.0 to 20.0. The bunching at $20=20$, and $30=30$ is so great that the computation of corresponding percentile scores does not give smooth curves. We use Table A36 opposite, which is reasonable and fits the facts as well as any simple set of equivalents. The original plots are appended as Tables A37 and A38.

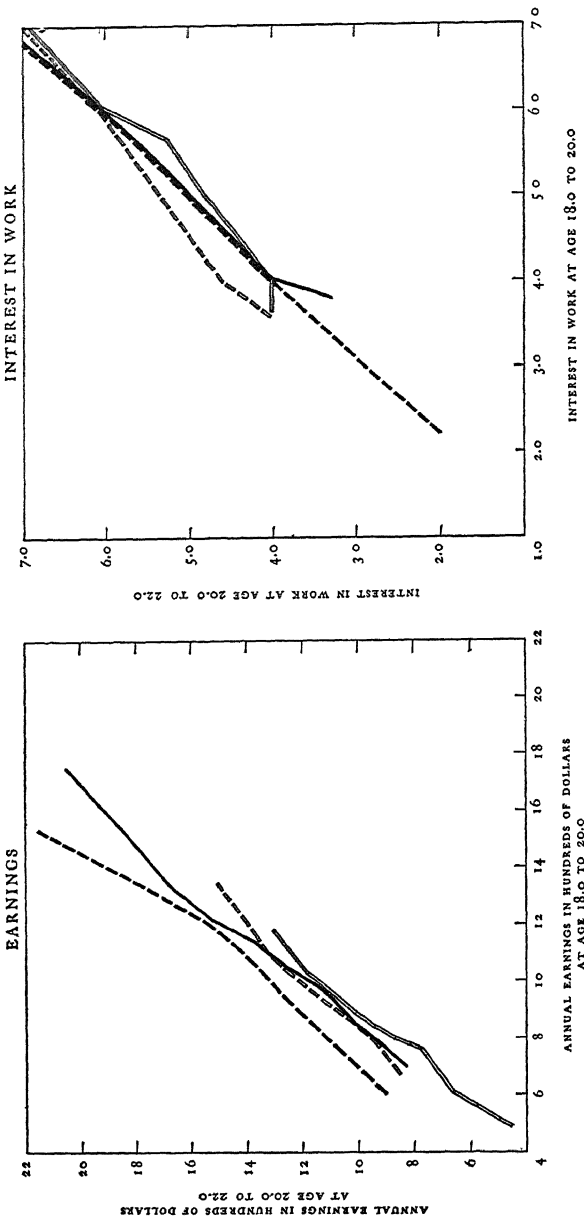
TABLE A 3 6

Data for estimating the probable level of work at age 20.0 to 22.0 from any given level at age 18.0 to 20.0 and vice versa. The average level at C or at M work in either period in the case of a person who did that sort of work in the other period only

AT C WORK		AT M WORK	
<i>At age</i> 18.0-20.0	<i>At age</i> 20.0-22.0	<i>At age</i> 18.0-20.0	<i>At age</i> 20.0-22.0
10	12	10	10 (11, 12)
11	12	11	13
12	13	12	14
13	14	13	15
14	15	14	16
15	16	15	17
16	17	16	18
17	18	17	19
18	19	18	20
19	20	19	21
20	21	20	22
21	22	21	23
22	23	22	24
23	24	23	25
24	25	24	26
25	26	25	27
26	27	26	28
27	28	27	29
28	29	28	30
29	30	29	31
30	31	30	32
31	32	31	33 (34)
32	33	32	35
33	34	33	36
34	35 (36)	34	37
35	37	35	38 (39)
36	38	36	40
37	39	37	41
38	40	38	42
39	41	39	43 (44)
40	42 (43)	40	45
41	44 (45)	41	46
42	46	42	47

THE RELATION OF VOCATIONAL STATUS
AT AGE 20.0 TO 22.0 TO THAT AT AGE 18.0 TO 20.0

BOYS, ENGAGED IN MECHANICAL WORK
BOYS, ENGAGED IN CLERICAL WORK
GIRLS, ENGAGED IN MECHANICAL WORK
GIRLS, ENGAGED IN CLERICAL WORK



The measures of interest in work at age 20.0 to 22.0 were plotted in relation to the measures of interest at age 18.0 to 20.0 in the same way, except that because of the bunching of the scores at 40, 50, and 60, we use only the 5th, 20th, 50th, 80th, and 95th percentiles. The four relation lines are shown on page 206. The formula, interest at age 20.0 to 22.0 = interest at age 18.0 to 20.0, fits them well enough for our purpose.

B. RECORDS OF THE PERIOD FROM AGE 16.0 TO AGE 18.0

For a summary of the vocational record of the 16.0 to 18.0 age period of those who left school at 16.0 or before, a blue card similar to the one for those at age 18.0 to 22.0 (page 199) was used, with boxes 52 to 64 corresponding to boxes 22 to 34, and the following directions.

Use boxes 52 to 57 for computed entries. Use the space above boxes 52 to 57, etc., for entering the essential data whence the computations are made, and for explanatory notes.

The measures to be entered in boxes 52 to 64 are as follows:

- Box 52. Average earnings per year, at age 17.0 to 18.0, to nearest dollar
- Box 53. Average level per year, at age 17.0 to 18.0, to nearest tenth
- Box 54. Average interest per year, at age 17.0 to 18.0, to nearest tenth
- Box 55. Percentage of time employed per year, at age 17.0 to 18.0, to nearest percent
- Box 56. Number of changes of employer per year, at age 17.0 to 18.0
- Box 60. Same as in 52 but for age 16.0 to 17.0
- Box 61. Same as in 53 but for age 16.0 to 17.0
- Box 62. Same as in 54 but for age 16.0 to 17.0
- Box 63. Same as in 55 but for age 16.0 to 17.0
- Box 64. Same as in 56 but for age 16.0 to 17.0

Each one of the five pairs of items is averaged to secure corresponding items for the period 16.0 to 18.0.

All averages for 53, 54, 61, and 62 are weighted by the number of weeks. If a person worked at both C and M jobs during either period (16.0 to 17.0 or 17.0 to 18.0), any weeks unemployed are to be allotted to C and M as follows: if a period of unemployment is preceded and followed by C work alone or by M work alone, allot the unemployment all to C or all to M; if a period of unemployment is preceded by one of C or M and followed by the other, allot half to each. The sum of C earnings is to be divided by the total weeks working at C plus the unemployed weeks allotted to C. Similarly for M.

In the case of a person who remains in school a trifle over 16.0, a blue card can be made, provided there is at least a nine-month work record, including time spent in search for work.

The above matter of a nine-month record will also apply to a girl who marries either during the 16.0 to 17.0 period or the 17.0 to 18.0 period.

APPENDIX X

DETERMINATION OF COMPOSITE MEASURES DERIVED FROM SCHOOL RECORD AND TEST SCORES AT AGE 14.0 AND THE VALUE OF SUCH MEASURES IN PROPHECYING LATER EDUCA- TIONAL SUCCESS

THE data for solving our two problems are found in Tables A39, A40, A41, and A42 below, of which Tables 31 to 34 in Chapter V are abbreviations. The correct method of procedure would be to determine sixteen multiple correlations for the best composites of Items 2a (or 2r),¹ 10, 11, 12, and 13 to use in prophesying Items 18, 19, and 20, in each of the four groups (Boys Age Group, Girls Age, Boys Grade, and Girls Grade). These should then be compared with the correlations of Items 3 and 9 with Items 18, 19, 20, and 21, and also with the multiple correlation of the best composite of Items 3 and 9 with Items 18, 19, and 20 in the same four groups.

It seemed, however, unwise to spend so much time and money on this work, when a briefer procedure would give results nearly as trustworthy and free from any prejudicial error. First of all, we decided to cut the labor in half by using the averages of the correlations for the Boys Age Group and the Girls Age Group, and the averages of the correlations for the Boys Grade Group and the Girls Grade Group. Next we decided that, since 1) Item 2r (or 2a) is easily obtainable in any school system and for any individual, whereas Item 10 is very hard to obtain except by estimation on the basis of the individual's memory of the date of his entrance to grade 1, and since 2) Item 2r is Item 10 plus a variable representing variations in the age of entering grade 1, we will insert Item 2r (or 2a) in all

¹ See page xxii for definitions of items.

TABLE A 39

Intercorrelations of Items 2a, 3, 5 . . . 21. Boys Age Group. n=266

[illegible]

TABLE A 3 9 (continued)

	Item 12	Item 13	Item 16	Item 17	Item 18	Item 19	Item 20	Item 21
SD	8.8705	6.3083	12.1201	2.6357	3.7033	2.6334	6.2230	7.3611
Av.	34.1015	91.5075	57.7556	18.7331	15.5226	8.1992	61.0414	50.8120
2 ^a	.4437	.2300	.0378	.1826	.7106	.1278	.2640	.3650
3	.5306	.2017	.0173	.1278	.6489	.3138	.4060	.5054
5	.0366	.1273	.0079	.0064	.0536	.0484	— .0278	.0208
14	.3268	.0319	.0109	.0848	.3912	.1714	.2939	.3198
7	.3780	.0825	— .0580	.0325	.4801	.3015	.3376	.4328
8	.4270	.0371	— .0450	.0395	.5098	.2901	.3829	.4499
9	.4394	.0648	— .0561	.0393	.5400	.3225	.3933	.4814
10	.5046	.1897	.0531	.0070	.6839	.2324	.2942	.4305
11	.6165	.1685	.1444	.0862	.3768	.2854	.3466	.3890
12		.2850	.2050	.1481	.5665	.4899	.5060	.6168
13			.1538	.2181	.3005	.1603	.2246	.2554
16				.8404	.6135	.1138	.2495	.3157
17					.6428	.0576	.2453	.2919
18						.4466	.5056	.7078
19							.5089	.8666
20								.8172

TABLE A40 (continued)

[illegible]

our multiple correlations before Item 10. Further, since Item 12 will obviously be much more important in the multiple correlation than Item 11 or 13 we compute first the multiple correlation for Items 12+2.

We find the multiple r 's for Items 12 and 2 in the Grade Groups to be as shown below. We find the increases made by using Items 2, 12, and 10, Items 2, 12, and 11, and Items 2, 12, and 13, respectively, to be as shown below.

	<i>Item 18</i>	<i>Item 19</i>	<i>Item 20</i>
Items 12+2	.5793	.2193	.3027
<i>Increases</i>			
Items 12+2+10	.0000	.0009	.0005
Items 12+2+11	.0027	.0045	.0067
Items 12+2+13	.0004	.0007	.0168

The multiple correlations including any combinations of Items 10, 11, and 13 will thus add little or nothing to Items 2+12, or to Item 12 save in the case of Item 18.

The facts for the Grade Groups are:

	<i>Item 18</i>	<i>Item 19</i>	<i>Item 20</i>
Item 12	.47	.22	.30
Items 12+2	.58	.22	.30
Items 12+2+13	.58	.22	.32
Items 12+2+13+11	.58	.22	.33
Items 12+2+13+11+10	.58	.22	.33

In consideration of these facts and of the first order correlations in the Age Groups, we proceed in the Age Groups to make the multiples Items 2a+12, 2a+12+13, etc.

They give the following correlations:

	<i>Item 18</i>	<i>Item 19</i>	<i>Item 20</i>
Item 12	.54 (.5373)	.39 (.3878)	.46 (.4591)
Items 12+2a	.79 (.7940)	.40 (.4047)	.47 (.4712)
Items 12+2a+13	.80 (.8014)	.41 (.4072)	.48 (.4830)
Items 12+2a+13+11	.80 (.8035)		.49 (.4858)
Items 12+2a+13+11+10	.81 (.8054)		.49 (.4882)

It is clear that the only educational items which are worth considering for a composite with the intelligence scores are Items 12 and 2. We therefore compute the multiple correlations shown below:

<i>Grade Group</i>	<i>Item 18</i>	<i>Item 19</i>	<i>Item 20</i>
Item 3	.47 (.4718)	.22 (.2183)	.26 (.2585)
Item 9	.46 (.4646)	.21 (.2051)	.27 (.2658)
Items 3+9	.50 (.5005)	.23 (.2269)	.28 (.2800)
Items 3+9+12	.54 (.5385)	.25 (.2468)	.32 (.3247)
Items 3+9+12+2	.58 (.5821)	.25 (.2516)	.33 (.3348)

<i>Age Group</i>	<i>Item 18</i>	<i>Item 19</i>	<i>Item 20</i>
Item 3	.62 (.6237)	.22 (.2157)	.43 (.4275)
Item 9	.59 (.5862)	.24 (.2375)	.40 (.4047)
Items 3+9	.64 (.6386)	.24 (.2404)	.44 (.4389)
Items 3+9+12	.67 (.6728)	.39 (.3891)	.51 (.5073)
Items 3+9+12+2	.78 (.7833)	.41 (.4123)	.51 (.5112)

Since Item 12 may be hard to obtain, and will have less significance when the predictions are for individuals from two or more school systems with varying standards, we have computed the results where only the age-grade status (2r or 2a) and the intelligence scores are used. The facts are:

<i>Grade Group</i>	<i>Item 18</i>	<i>Item 19</i>	<i>Item 20</i>
Item 2r (or 2a)	.55 (.5549)	.16 (.1576)	.18 (.1840)
Items 3+9	.50 (.5005)	.23 (.2269)	.28 (.2800)
Items 3+9+2	.57 (.5678)	.23 (.2283)	.28 (.2835)

Age Group

Item 2r (or 2a)	.77 (.7740)	.09 (.0916)	.32 (.3195)
Items 3 + 9	.64 (.6386)	.24 (.2404)	.44 (.4389)
Items 3 + 9 + 2	.78 (.7752)	.28 (.2805)	.44 (.4414)

Item 2r (or 2a) alone gives almost as good a prediction of Item 18 as Items 3 + 9 + 2. Items 3 + 9 alone give almost as good a prediction of Items 19 and 20 as Items 3 + 9 + 2.

The correlations with future educational success may be reasonably explained as follows. Item 9 measures, though imperfectly, the ability of the child with words and numbers in tasks much like those required in school work. Item 3 measures, also imperfectly, the ability of the child with words and numbers in tasks much less like those required in school work. The significance of Item 3 for future educational success is closely similar to that of Item 9, and the significance of either will be found closely similar to the significance of any of the standard measures of abstract intellect. Item 12 is a record of teachers' opinions of the pupil's success in doing school work over a period of years. This is a product of abstract intelligence, industry, and attendance, contaminated doubtless by the teachers' errors of judgment. These consist largely in imputing scholarship to those who show industry, good behavior, and attractive personalities (all from the teachers' point of view). Item 2r (or 2a) is a mixture of a) promotion rate which is determined largely by Item 12, and b) age at entrance to grade 1, which is in turn due partly to abstract intelligence and partly to "accidental" factors (of custom, home conditions, health, etc.).

If teachers were omniscient and infallible, Item 12 would predict future success in Items 19 and 20 presumably much better than Item 3 or 9 or Items 3 + 9. The two concern the reactions of the same individual to the same type of situation or task, one from age 6 to age 14 or from grade 1 to grade 8, the other from age 14 or grade 8 on to leaving school. The only differences are that the individual is at a later stage in his life, and the tasks are somewhat

different in details. Even with errors of prejudice, Item 12 should predict future success in Items 19 and 20 much better than Item 3 or 9 or 3 + 9, because the errors of the teachers who give the future grades, which determine the future rate of progress, are probably of the same nature as those of the earlier teachers who determined Item 12 and so in part Item 2r (or 2a).

The main reason why an intelligence test of an hour so nearly approximates in predictive value the combined judgment of a number of teachers, each of whom has rated scores of tests and observed the pupil for five months, must then be that the judgments of the teachers have large variable errors. A minor reason is that the test is nearer in time to the future career of the pupil than the average of the grades given by his teachers up to the time of the test.

If we had objective measures of future educational success in the shape of tests of the pupil's actual mastery of the subjects studied, and promotion rates determined solely by achievement, we should then find that Item 12 would, in predicting these, be less superior to Item 3 or 9, and perhaps be inferior to them. Item 19, and so Item 20, is partly determined by errors of prejudice similar to those which determine Item 12. Eliminating these might well lower $r_{12\ 19}$ and $r_{12\ 20}$, but could only raise $r_{3\ 19}$ and $r_{3\ 20}$ or $r_{9\ 19}$ and $r_{9\ 20}$. Making a distinction between a pupil's success in scholarly work itself and his success in getting good grades from teachers, we should expect Item 3 or 9 to be better in comparison with Item 12 in predicting the former. Consequently, even in cases where a record of several past teachers' estimates is available, the counselor may wisely consider the score in an intelligence test in predicting future educational success.

Item 2r (or 2a) is naturally especially useful to predict Item 18 because, for children who remain in school to any given age, Item 18 is determined absolutely by Item 2r (or 2a) plus whatever causes determine his rate of progress after the tests. In the group as a whole, we have also the cooperation of the causes which make some stay to later years than others. Since the qualities represented by Items 12

and 3 and 9 play their part nearly as fully in determining Item 2r (or 2a) as in determining Item 18, we do not expect them to add much to the value of Item 2r (or 2a) in predicting Item 18. So we find that Item 2r (or 2a) is nearly as good as the best multiple of Items 2r (or 2a), 12, and 3+9 in predicting Item 18 (.55 versus .58 for the Grade Groups, and .77 versus .78 for the Age Groups).

It is unfortunate that we had no measures of the economic status of the families of the children. If such measures predicted the age to which children would stay in school at all closely, they would raise substantially the multiple correlation predicting Item 18. For Item 16 with Item 2 (or 2a) gives very nearly perfect prediction of Item 18. In the Grade Groups where $r_{2\ 18} = .5549$, $r_{16\ 18} = .8375$, and $r_{2\ 16} = .0805$, the multiple is .97. In the Age Groups where $r_{2a\ 18} = .7740$, $r_{16\ 18} = .5636$, and $r_{2a\ 16} = .0323$, it is .95.

APPENDIX XI

TABLES SHOWING THE PREDICTIVE VALUE FOR VOCATIONAL SUCCESS OF EACH ITEM OF SCHOOL RECORD AND TEST SCORES AT AGE 14.0

NOTE: In Tables A43, A44, A45, A47, A48, and A49, mixed workers in the Grade Groups are divided into two sections:

1. Those at work at two or more jobs, one or more of which was entirely mechanical and the others entirely clerical;
2. Those at work at one or more jobs, each of which had mingled mechanical and clerical duties.

In the Age Groups, the numbers were too small to make such subdivision significant.

TABLE A 4 3

Correlations of each item of school record and test scores at age 14.0 with average annual earnings at age 20.0 to 22.0. For group W1, and those in group W2 who did not stop work for marriage till after age 21.0.

Earnings are made comparable by the correction of Table A35

	<i>Item</i>							
	<i>2a</i>	<i>3</i>	<i>4</i>	<i>14</i>	<i>15</i>	<i>5,6</i>	<i>7</i>	<i>8</i>
<i>Mechanical workers</i>								
B.A. (n=70)	-.02	.04		.07		-.07	.00	-.14
B.G. (n=140)	.04	-.05	.06	-.16	-.06	.14	.04	-.01
G.A. (n=34)	-.01	.09	-.07	.19	-.03	-.03	.12	.27
G.G. (n=121)	.28	.05	.17	-.10	-.02	.19	.17	.19
Average	.07	.03	.05	.00	-.04	.06	.07	.08
Weighted average	.10	.01	.09	-.06	-.04	.10	.08	.06
<i>Mixed workers</i>								
B.A. (n=55)	.18	.32		.15		.12	.19	.22
B.G.1 (n=116)	-.04	.06	.02	-.04	-.08	.14	.09	.04
B.G.2 (n=48)	-.42	-.22	-.33	-.25	-.33	.15	-.14	-.16
G.A. (n=19)	.47	.42	.30	-.14	-.25	.48	.49	.33
G.G.1 (n=34)	.22	.30	.39	.09	.12	.18	.08	.36
G.G.2 (n=33)	.20	.04	-.01	.15	.08	-.05	.15	.34
Average	.10	.15	.07	-.01	-.07	.17	.14	.19
Weighted average	.02	.10	.01	-.01	-.09	.14	.10	.12
<i>Clerical workers</i>								
B.A. (n=33)	.19	.23		-.16		.39	.37	.34
B.G. (n=190)	.17	.21	.21	.09	.11	.06	.14	.11
G.A. (n=48)	.09	.23	.13	-.16	-.28	.45	-.05	.00
G.G. (n=199)	.23	.31	.25	.05	.01	.21	.16	.24
Average	.17	.25	.20	-.05	-.05	.28	.16	.17
Weighted average	.19	.26	.22	.03	.02	.19	.14	.17

TABLE A 4 3 (continued)

	<i>Item</i>						
	9	10	11	12	13	16	18
<i>Mechanical workers</i>							
B.A. (n=70)	-.08	-.05	.05	.17	.14	-.26	-.03
B.G. (n=140)	.01	.04	-.04	-.04	-.03	-.06	-.02
G.A. (n=34)	.20	.14	.00	.11	-.04	.06	.07
G.G. (n=121)	.21	.11	-.02	.05	-.03	.01	.22
Average	.09	.06	.00	.07	.01	-.06	.06
Weighted average	.08	.06	-.01	.04	.00	-.06	.07
<i>Mixed workers</i>							
B.A. (n=55)	.21	.17	.19	.18	-.02	-.29	.07
B.G.1 (n=116)	.08	-.07	-.17	-.10	-.03	-.15	-.15
B.G.2 (n=48)	-.16	-.22	-.49	-.28	-.04	-.17	-.36
G.A. (n=19)	.43	.57	.10	.33	-.24	.35	.45
G.G.1 (n=34)	.25	.22	.17	.28	-.03	.29	.46
G.G.2 (n=33)	.26	.24	-.01	.11	-.09	.24	.65
Average	.18	.15	-.04	.09	-.08	.05	.19
Weighted average	.12	.05	-.09	.04	-.05	-.06	.04
<i>Clerical workers</i>							
B.A. (n=33)	.40	.15	-.27	.16	.13	.11	.26
B.G. (n=190)	.13	.11	-.17	.00	-.12	-.11	-.03
G.A. (n=48)	-.02	.01	.03	.01	.27	-.07	-.00
G.G. (n=199)	.23	.22	.05	.23	.02	-.26	-.05
Average	.19	.16	-.09	.10	.08	-.08	.05
Weighted average	.17	.14	-.07	.11	.00	-.15	-.01

TABLE A 4 4

Correlations of each item of school record and test scores at age 14.0 with average level of job at age 20.0 to 22.0. For group W1, and those in group W2 who did not stop work for marriage till after age 21.0

	<i>Item</i>						
	2r, 2a	3	4	14	15	5, 6	7
<i>Mechanical workers</i>							
B.A. (n=70)	-.03	-.12		-.15		.08	-.07
B.G. (n=139)	-.08	-.03	-.05	-.23	-.21	.23	-.05
G.A. (n=34)	.10	-.02	-.02	-.12	-.08	.08	.00
G.G. (n=121)	.15	.06	.09	.00	-.01	.09	.04
Average	.04	-.03	.01	-.13	-.10	.12	-.02
Weighted average	.02	-.02	.01	-.13	-.11	.14	-.02
<i>Mixed workers</i>							
B.A. (n=55)	.03	.08		.07		.01	.22
B.G.1 (n=115)	-.06	.06	.06	-.06	-.06	.14	.10
B.G.2 (n=45)	-.31	-.21	-.23	-.21	-.21	.12	-.18
G.A. (n=19)	.22	.19	.17	-.20	-.18	.32	.36
G.G.1 (n=34)	.18	.21	.15	.23	.26	-.08	.09
G.G.2 (n=33)	.20	.28	.06	.08	-.08	.20	.12
Average	.04	.10	.04	-.01	-.06	.12	.12
Weighted average	-.02	.07	.02	-.02	-.06	.11	.09
<i>Clerical workers</i>							
B.A. (n=33)	.03	.21		-.03		.20	.17
B.G. (n=181)	.10	.20	.20	.04	.05	.14	.19
G.A. (n=48)	.17	.35	.20	.06	-.18	.35	.12
G.G. (n=194)	.19	.18	.11	.10	.04	.04	.17
Average	.12	.24	.17	.04	-.03	.18	.16
Weighted average	.14	.21	.16	.06	.02	.12	.17

TABLE A 4 4 (continued)

	<i>Item</i>							
	8	9	10	11	12	13	16	18
<i>Mechanical workers</i>								
B.A. (n=70)	-.15	-.12	-.10	.03	.11	-.02	-.16	-.06
B.G. (n=139)	-.02	-.04	-.01	.03	-.05	.02	.06	-.06
G.A. (n=34)	.01	.01	.12	-.07	.05	.19	.11	.24
G.G. (n=121)	.09	.07	.09	.19	.20	-.02	.19	.29
Average	-.02	-.02	.03	.05	.08	.04	.05	.10
Weighted average	-.01	-.01	.02	.07	.07	.02	.07	.09
<i>Mixed workers</i>								
B.A. (n=55)	.21	.21	.01	.15	.30	.11	-.14	.02
B.G.1 (n=115)	.04	.09	.00	-.11	.07	.03	-.02	-.02
B.G.2 (n=45)	-.13	-.18	-.32	-.30	-.25	.03	-.14	-.29
G.A. (n=19)	.17	.28	.19	.06	-.05	-.26	.35	.35
G.G.1 (n=34)	.15	.16	.22	.13	.21	.00	.22	.38
G.G.2 (n=33)	.36	.26	.25	.06	.22	.11	.19	.47
Average	.13	.14	.06	.00	.08	.00	.08	.15
Weighted average	.10	.10	.01	-.04	.08	.03	.01	.06
<i>Clerical workers</i>								
B.A. (n=33)	.16	.19	-.05	-.24	-.05	.28	.16	.17
B.G. (n=181)	.11	.17	.06	-.17	.06	-.11	-.05	.03
G.A. (n=48)	.16	.16	.15	-.04	.09	-.11	.07	.32
G.G. (n=194)	.14	.19	.20	.10	.23	.01	.12	.24
Average	.14	.18	.09	-.09	.08	.02	.08	.19
Weighted average	.13	.18	.12	-.05	.13	-.03	.05	.16

TABLE A 4 5

Correlations of each item of school record and test scores at age 14.0 with average interest in job at age 20.0 to 22.0. For group W1, and those in group W2 who did not stop work for marriage till after age 21.0

	<i>Item</i>						
	<i>2a, 2r</i>	<i>3</i>	<i>4</i>	<i>14</i>	<i>15</i>	<i>5, 6</i>	<i>7</i>
<i>Mechanical workers</i>							
B.A. (n=70)	-.01	.02		.25		-.30	-.07
B.G. (n=140)	.10	.06	.07	-.11	-.10	.18	.09
G.A. (n=34)	-.03	.04	-.23	.03	-.06	-.12	-.02
G.G. (n=121)	.00	-.03	.08	-.19	-.10	.19	.10
Average	.02	.02	-.03	-.01	-.09	-.02	.03
Weighted average	.03	.02	.04	-.05	-.10	-.07	.05
<i>Mixed workers</i>							
B.A. (n=55)	.22	.23		-.01		.26	.38
B.G.1 (n=116)	-.05	-.06	-.06	-.17	-.14	.14	-.10
B.G.2 (n=48)	-.22	-.24	-.09	-.11	-.04	-.06	.01
G.A. (n=19)	.22	.19	.17	-.20	-.18	.32	.36
G.G.1 (n=34)	.22	.21	.34	.11	.20	.07	.13
G.G.2 (n=35)	.11	.12	-.18	.13	-.16	-.02	.16
Average	.08	.04	.04	.04	-.06	.12	.16
Weighted average	.05	.02	-.04	.07	.07	.11	.08
<i>Clerical workers</i>							
B.A. (n=33)	-.01	.00		-.02		.04	.29
B.G. (n=181)	.08	.19	.13	.10	.09	.02	.11
G.A. (n=48)	.04	.14	.11	-.11	-.16	.27	.02
G.G. (n=194)	-.12	.01	.02	.02	.01	.00	-.03
Average	.00	.09	.09	.00	-.02	.08	.10
Weighted average	-.01	.10	.08	.04	.03	.04	.06

TABLE A 4 5 (continued)

	<i>Item</i>							
	8	9	10	11	12	13	16	18
<i>Mechanical workers</i>								
B.A. (n=70)	-.02	-.04	-.08	-.11	-.04	-.16	-.13	-.03
B.G. (n=140)	-.03	.05	.08	.02	.00	.07	.01	.02
G.A. (n=34)	.11	.02	.06	-.01	-.05	-.13	.12	.07
G.G. (n=121)	.12	.13	-.07	-.06	-.05	-.16	.05	-.01
Average	.05	.04	.00	-.04	-.04	-.10	.01	.01
Weighted average	.04	.06	.00	-.03	-.03	-.07	.01	.01
<i>Mixed workers</i>								
B.A. (n=55)	.22	.28	.26	.16	.19	.08	-.14	.24
B.G.1 (n=116)	-.18	-.15	-.10	-.01	-.06	.08	-.22	-.17
B.G.2 (n=48)	-.04	-.01	-.09	-.02	-.08	.14	.18	.02
G.A. (n=19)	.17	.28	.19	.06	-.05	-.26	.35	.35
G.G.1 (n=34)	-.04	.05	.31	.48	.18	.10	-.06	.14
G.G.2 (n=35)	.12	.13	.08	-.02	.03	-.01	.05	.25
Average	.04	.10	.11	.11	.04	.02	.03	.14
Weighted average	-.02	.02	.04	.07	.02	.06	.06	.04
<i>Clerical workers</i>								
B.A. (n=33)	.13	.23	-.06	.15	.11	.04	-.11	-.14
B.G. (n=181)	.04	.09	.09	-.04	.11	.05	.00	.05
G.A. (n=48)	.15	.06	.14	.02	.08	.10	.02	.08
G.G. (n=194)	-.07	-.06	-.08	-.02	-.01	.03	-.03	-.09
Average	.06	.08	.02	.03	.07	.06	-.03	-.03
Weighted average	.01	.04	.01	-.01	.06	.05	-.02	-.02

TABLE A 4 6

Correlations of each item of school record and test scores at age 14.0 with earnings, level of job, and interest in job. For those in all groups at all sorts of work at age 20.0 to 22.0

	<i>Item</i>							
	<i>2a, 2r</i>	<i>3</i>	<i>4</i>	<i>14</i>	<i>15</i>	<i>5, 6</i>	<i>7</i>	<i>8</i>
<i>Earnings</i>								
B.A. (n=158)	.12	.19		.09		.05	.15	.12
B.G. (n=494)	.02	.05	.05	-.06	-.05	.12	.07	.03
G.A. (n=101)	.24	.33	.22	.04	-.14	.33	.18	.20
G.G. (n=387)	.28	.23	.22	.07	.05	.14	.22	.30
Average	.17	.20	.16	.04	-.04	.16	.16	.16
Weighted average	.14	.15	.14	.01	-.02	.14	.14	.15
<i>Level</i>								
B.A. (n=158)	.03	.05		-.02		.07	.10	.09
B.G. (n=494)	-.01	.08	.06	-.09	-.09	.20	.08	.05
G.A. (n=101)	.35	.41	.30	.11	-.07	.32	.25	.29
G.G. (n=387)	.26	.22	.14	.14	.07	.04	.21	.23
Average	.13	.19	.17	.04	-.02	.16	.16	.17
Weighted average	.12	.16	.12	.02	-.02	.14	.14	.14
<i>Interest</i>								
B.A. (n=158)	.06	.08		.10		-.07	.14	.08
B.G. (n=494)	.01	.08	.07	-.01	.00	.07	.06	.00
G.A. (n=101)	.11	.17	.05	-.02	-.11	.15	.09	.20
G.G. (n=387)	.00	.05	.06	.00	.00	.05	.08	.05
Average	.05	.10	.06	.02	-.04	.05	.09	.08
Weighted average	.10	.08	.06	.01	-.01	.05	.08	.05

TABLE A 4 6 (continued)

	<i>Item</i>						
	9	10	11	12	13	16	18
<i>Earnings</i>							
B.A. (n=158)	.15	.08	.05	.17	.09	-.12	.11
B.G. (n=494)	.06	.00	-.16	-.07	-.06	-.12	-.10
G.A. (n=101)	.20	.17	.10	.15	.10	.08	.23
G.G. (n=387)	.29	.24	.03	.20	-.03	-.02	.18
Average	.18	.16	.01	.11	.03	-.05	.11
Weighted average	.16	.11	-.04	.07	-.02	-.07	.05
<i>Level</i>							
B.A. (n=158)	.11	-.03	.02	.14	.09	-.03	.06
B.G. (n=494)	.08	.00	-.10	.00	-.03	-.02	-.02
G.A. (n=101)	.29	.25	.14	.31	.06	.17	.43
G.G. (n=387)	.25	.25	.15	.28	-.02	.25	.39
Average	.18	.12	.09	.18	.03	.10	.22
Weighted average	.16	.10	.02	.14	.00	.09	.17
<i>Interest</i>							
B.A. (n=158)	.11	.03	.03	.06	-.05	-.13	.03
B.G. (n=494)	.04	.05	.00	.05	.06	.01	.04
G.A. (n=101)	.14	.11	.03	.06	-.07	.14	.19
G.G. (n=387)	.07	.00	.01	.01	-.04	.02	.01
Average	.09	.05	.02	.05	-.03	.01	.07
Weighted average	.07	.04	.01	.04	.00	.01	.04

TABLE A 47

Correlations of each item of school record and test scores at age 14.0 with average annual earnings at age 18.0 to 20.0. The persons are the same as in Table A43, except for a few individuals whose histories from 18.0 to 20.0 were defective

	<i>Item</i>						
	<i>2r, 2a</i>	<i>3</i>	<i>4</i>	<i>14</i>	<i>15</i>	<i>5, 6</i>	<i>7</i>
<i>Mechanical workers</i>							
B.A. (n=70)	-.01	-.02		.04		-.09	-.12
B.G. (n=139)	-.01	-.03	.06			.08	
G.A. (n=34)	.28	.24	.13	.27	.14	-.02	.35
G.G. (n=121)	.33	.15	.15			.13	
Average	.15	.09	.11			.03	
Weighted average	.13	.06	.12			.05	
<i>Mixed workers</i>							
B.A. (n=55)	.04	.08		-.02		.12	.14
B.G.1 (n=115)	.03	.08	.03			.16	
B.G.2 (n=45)	-.38	-.02	-.21			.00	
G.A. (n=19)	.16	.34	.39	-.01	.05	.28	.36
G.G.1 (n=34)	.19	.32	.23			.21	
G.G.2 (n=33)	.28	.16	.05			.13	
Average	.05	.16	.08			.15	
Weighted average	.02	.11	.04			.14	
<i>Clerical workers</i>							
B.A. (n=33)	.06	.10		-.28		.37	.22
B.G. (n=181)	.17	.11	.05			.08	
G.A. (n=48)	.10	.21	.11	-.19	-.30	.46	-.09
G.G. (n=194)	.26	.34	.26			.19	
Average	.15	.19	.14			.28	
Weighted average	.17	.19	.14			.22	

TABLE A 47 (continued)

	<i>Item</i>							
	8	9	10	11	12	13	16	18
<i>Mechanical workers</i>								
B.A. (n=70)	-.16	-.16	-.04	.10	.26	.15	-.06	.03
B.G. (n=139)		-.03		.03	.04	-.07		
G.A. (n=34)	.36	.38	.09	-.16	.14	-.03	-.15	.21
G.G. (n=121)		.17		.02	.05	-.01		
Average		.09		.00	.12	.01		
Weighted average		.05		.02	.09	.00		
<i>Mixed workers</i>								
B.A. (n=55)	.01	.05	.08	.06	.15	.09	-.28	-.04
B.G.1 (n=115)		.07		-.05	.04	.09		
B.G.2 (n=45)		-.19		-.37	-.20	.25		
G.A. (n=19)	.27	.35	.22	-.14	.01	-.17	.23	.22
G.G.1 (n=34)		.25		-.16	.17	.01		
G.G.2 (n=33)		.35		.06	.12	-.02		
Average		.15		-.10	.05	.04		
Weighted average		.09		-.09	.04	.08		
<i>Clerical workers</i>								
B.A. (n=33)	.03	.14	-.06	-.07	-.05	.06	-.20	-.09
B.G. (n=181)		.08		-.24	-.09	-.12		
G.A. (n=48)	-.01	-.05	.05	-.02	.05	.21	-.15	-.10
G.G. (n=194)		.19		.09	.16	.10		
Average		.09		-.06	.02	.06		
Weighted average		.13		-.08	.02	.02		

TABLE A 4 8

Correlations of each item of school record and test scores at age 14.0 with average level of job at age 18.0 to 20.0. The persons are the same as in Table A44 except for a few individuals whose histories from 18.0 to 20.0 were defective

	<i>Item</i>						
	<i>2r, 2a</i>	<i>3</i>	<i>4</i>	<i>14</i>	<i>15</i>	<i>5, 6</i>	<i>7</i>
<i>Mechanical workers</i>							
B.A. (n=70)	.13	.04		-.17		.20	-.11
B.G. (n=139)	-.10	-.09	-.09			.17	
G.A. (n=34)	.05	-.05	-.06	-.09	-.14	.04	.03
G.G. (n=121)	.13	-.01	.05			.15	
Average	.05	-.03	-.03			.14	
Weighted average	.03	-.03	-.03			.16	
<i>Mixed workers</i>							
B.A. (n=55)	.12	.15		.10		.06	.11
B.G.1 (n=115)	-.09	-.04	-.01			-.06	
B.G.2 (n=45)	-.29	-.08	-.12			.02	
G.A. (n=19)	.47	.58	.38	.06	-.12	.45	.50
G.G.1 (n=34)	.29	.53	.26			.08	
G.G.2 (n=33)	.18	.18	.06			.22	
Average	.17	.22	.11			.13	
Weighted average	.12	.11	.04			.05	
<i>Clerical workers</i>							
B.A. (n=33)	.04	.25		.14		.08	.23
B.G. (n=181)	.07	.07	.04			.02	
G.A. (n=48)	.12	.30	.15	.00	-.24	.36	.04
G.G. (n=194)	.21	.18	.18			.10	
Average	.11	.20	.12			.14	
Weighted average	.13	.15	.11			.10	

TABLE A 48 (continued)

	<i>Item</i>							
	8	9	10	11	12	13	16	18
<i>Mechanical workers</i>								
B.A. (n=70)	.07	-.01	.03	.22	.20	.11	.04	.13
B.G. (n=139)		-.05		.02	-.06	-.11		
G.A. (n=34)	-.03	.01	-.02	-.34	.01	.16	.05	.14
G.G. (n=121)		.05		.18	.14	-.07		
Average		.00		.02	.07	.02		
Weighted average		.03		.08	.06	.03		
<i>Mixed workers</i>								
B.A. (n=55)	.10	.10	.08	.19	.22	.08	-.14	.09
B.G.1 (n=115)		-.10		-.05	-.01	.12		
B.G.2 (n=45)		-.24		-.10	-.05	.35		
G.A. (n=19)	.57	.55	.41	.13	.25	-.05	.36	.44
G.G.1 (n=34)		.32		.18	.29	.10		
G.G.2 (n=33)		.06		-.01	.12	.16		
Average		.12		.06	.14	.12		
Weighted average		.01		.02	.08	.15		
<i>Clerical workers</i>								
B.A. (n=33)	.24	.27	.02	.35	.08	.19	-.09	.08
B.G. (n=181)		.10		-.26	.03	-.06		
G.A. (n=48)	.12	.10	.15	.00	.07	-.05	.00	.21
G.G. (n=194)		.19		.10	.22	.02		
Average		.17		.05	.10	.03		
Weighted average		.15		-.03	.12	-.01		

TABLE A 49

Correlations of each item of school record and test scores at age 14.0 with average interest in job at age 18.0 to 20.0. The persons are the same as in Table A45, except for a few individuals whose histories from 18.0 to 20.0 were defective

	<i>Item</i>						
	2r, 2a	3	4	14	15	5, 6	7
<i>Mechanical workers</i>							
B.A. (n=70)	.04	.02		.14		-.17	-.04
B.G. (n=139)	.10	.08	.07			.13	
G.A. (n=34)	.13	-.03	-.13	-.24	-.28	.14	-.01
G.G. (n=121)	-.07	-.13	.04			.17	
Average	.05	-.02	-.01			.07	
Weighted average	.03	-.01	.03			.09	
<i>Mixed workers</i>							
B.A. (n=55)	.13	-.02		-.27		.34	.16
B.G.1 (n=115)	-.02	-.02	.03			.07	
B.G.2 (n=45)	-.11	-.05	.20			-.13	
G.A. (n=19)	.17	.13	.03	-.09	-.16	.18	.48
G.G.1 (n=34)	.29	.30	.20			.05	
G.G.2 (n=33)	-.10	-.07	-.24			-.13	
Average	.06	.05	.04			.06	
Weighted average	.03	.01	.04			.06	
<i>Clerical workers</i>							
B.A. (n=33)	-.10	-.13		.02		-.10	.25
B.G. (n=181)	.08	.14	.07			.07	
G.A. (n=48)	.00	.09	.02	-.03	-.10	.14	-.10
G.G. (n=194)	.09	-.02	.01			-.06	
Average	.02	.02	.03			.01	
Weighted average	.06	.05	.04			.01	

TABLE A 49 (continued)

	<i>Item</i>							
	8	9	10	11	12	13	16	18
<i>Mechanical workers</i>								
B.A. (n=70)	-.04	-.05	-.08	-.08	-.02	.10	-.11	.00
B.G. (n=139)		.07		.01	-.05	.02		
G.A. (n=34)	.12	.03	.07	.00	.06	.07	.17	.18
G.G. (n=121)		.02		-.06	-.09	-.19		
Average		.02		-.03	-.03	.00		
Weighted average		.03		-.03	-.05	-.03		
<i>Mixed workers</i>								
B.A. (n=55)	.07	.11	.15	.03	.01	-.04	-.24	.00
B.G.1 (n=115)		-.15		-.09	.02	.10		
B.G.2 (n=45)		-.09		-.08	.15	.22		
G.A. (n=19)	.26	.40	.26	-.08	.06	-.35	.17	.16
G.G.1 (n=34)		.19		.41	.30	.01		
G.G.2 (n=33)		-.09		-.07	.07	-.17		
Average		.06		.02	.10	-.04		
Weighted average		-.02		-.01	.08	.03		
<i>Clerical workers</i>								
B.A. (n=33)	.02	.15	-.05	.18	.14	-.07	-.18	-.16
B.G. (n=181)		.08		-.10	.06	.06		
G.A. (n=48)	.09	-.02	.10	-.04	-.01	.12	.00	.06
G.G. (n=194)		-.11		-.03	-.02	.06		
Average		-.05		.00	.04	.05		
Weighted average		-.01		-.04	.02	.06		

APPENDIX XII

CORRECTION FACTORS FOR MAKING EARNINGS COMPARABLE FOR ANY PERIOD FROM JANUARY 1, 1923, TO JUNE 30, 1930

BY IRVING LORGE

PERSONS who entered industry after 1929 will be penalized if their earnings are compared with those of persons who entered industry earlier. After the peak year of 1929, chances for employment tended to decrease and beginning salaries to be curtailed, while the cost of living declined less rapidly than payrolls. An index of real wages has been developed to correct earned salaries so that bias would be minimized.

This index (the Vocational Guidance Follow-Up Index of Real Payroll, Series I) was developed in an arbitrary fashion. Since most of the boys and girls entered industry in the routine clerical and mechanical pursuits, it was decided to weight an index of manufacturing and mechanical trades payroll equally with that of an index of clerical payroll and then to correct for the cost of living. The manufacturing and mechanical index of payroll was available in the *Monthly Labor Bulletin* (United States Department of Labor Statistics) which we utilized in preference to the New York State Index because of its greater inclusiveness. The probability is that we have the same trend in both sets of data. There was not, however, readily available an index of clerical payrolls and, as a matter of fact, there is none today. The nearest measure of clerical payroll we have is the payroll statistics for professional, clerical, and general workers employed in Class I railroads. From these data, we developed an index of clerical payrolls referred to 1929 as a base. After referring the index of mechanical and manufacturing payrolls to the same base, the two indexes were averaged. This average index from

TABLE A 5 0

Gainfully employed persons in Age Group 20.0 to 24.0 in New York City in 1920, classified by broad industry grouping and by sex *

BROAD INDUSTRY GROUPING	MALES		FEMALES	
	<i>Number</i>	<i>Per cent gainfully employed</i>	<i>Number</i>	<i>Per cent gainfully employed</i>
Agriculture	618	.26	55	.03
Extraction of minerals	35	.01	6	.00
Manufacturing and mechanics	84,127	35.79	52,097	31.33
Trade	41,247	17.55	11,943	7.18
Transportation	34,701	14.76	7,680	4.62
Public service	6,196	2.64	88	.05
Professional service	10,245	4.36	13,968	8.40
Domestic and personal service	13,116	5.58	19,133	11.51
Clerical	44,743	19.04	61,297	36.87
<i>Total</i>	<i>235,028</i>		<i>166,267</i>	

* Fourteenth Census of U. S., 1920, vol. IV, pp. 1157-1179.

1923 to 1929 was assumed to indicate the trend of payroll payments for these years. The average index was then divided by the Cost of Living Index for New York City, referred to 1929 as a base. The result of this division was the V. G. F. U. Index of Real Payroll, Series I, for persons in industry from 1923 to 1929. The reciprocal of the Series I payroll index was the multiplying factor needed to correct earned salaries into real wages referred to a standard base. In this manner all corrected salaries for the boys and girls have the same meaning—the buying power in terms of 1929 dollars corrected for availability of salary. Payroll statistics are a function of employment, prevailing rate of pay, and number of hours worked.

Since the earnings for each person were computed for the two-year periods beginning with ages 18.0 and 20.0 respectively, it was necessary to average 24 reciprocals of the V. G. F. U., Series I, beginning with the month in which the birthday occurred. This average

of 24 reciprocals was, in effect, a moving average of 24 points. If a person had his eighteenth birthday in November, 1925, his earnings for the next two years must be multiplied by 103.1 in order to bring them into terms of real wages for 1929 corrected for the trend in salary payments.

For the period from January, 1929, to August, 1932, equal weighting of clerical and manufacturing indexes would not give a true picture of payroll conditions for our group, who by this time were in the age group 20 to 24. Since, beginning with 1929, indexes are available not only for clerical and manufacturing payrolls, but also for wholesale trade, retail trade, operation and maintenance of electric railroads, power, light and water, and telephone and telegraph, we judged it best to weight these indexes as the proportion of the age group 20 to 24 gainfully employed in these fields in 1920 in New York City. This was done. Table A50 gives the number and percentage of gainfully employed persons by sex and by broad industry groupings for New York City in 1920.

Since 96 per cent of all males at age 20 to 24 were gainfully employed and only 56 per cent of all females, each male percentage in a broad industry group was weighted by 2 against a weight of 1 for female percentages. This yielded weights as given below.¹

Agriculture	0
Extraction of minerals	0
Manufacturing and mechanics	35
Trade	15
Transportation	15
Public service	5
Domestic and personal	5
Clerical	25

¹ Since none of the boys or girls in our study were in the professional service group, and since no data are available from the Bureau of Labor for earnings of such a group, the weight to be assigned for professional service has been incorporated in the clerical group weight.

On the basis of these proportions, weights were assigned to the available indexes as follows:

Manufacturing and mechanics	35
Wholesale trade	10
Retail trade	5
Power, light, and water	5
Telephone and telegraph	10
Operation and maintenance of electric railroad	10
Clerical	25

The composite of these weighted indexes, referred to 1929 as base, gives an index of payroll which, when corrected for cost of living in terms of 1929 dollars, was the V. G. F. U. Index of Real Payroll, Series II. These indexes were not splined together since the moving average technique smoothed the values sufficiently.

These two series of indexes of real payroll were the data used to correct earned salaries into comparability.

Correction factors for any two-year period beginning January 1, 1923, referred to 1929 as base, appear in Table A51. Table A51 contains also correction factors referred to the period January, 1926, to December, 1928, as a base. These are the ones used by us because they reduce the magnitude of the correction toward a minimum for the working years studied for our groups, and so reduce the labor and danger of errors in making the corrections.

TABLE A 5 1

Correction factors to make earnings comparable. Multiply actual earnings in any month by the entry under "1929" or "1926, 1927, 1928" according to the base desired

FOR TWO-YEAR PERIOD BEGINNING			1926, 1927, 1928	FOR TWO-YEAR PERIOD BEGINNING			1926, 1927, 1928
1923			1929	1925			1929
1. January	101.8	98.4		1. January	103.5	100.1	
2. February	101.8	98.4		2. February	103.5	100.1	
3. March	101.8	98.4		3. March	103.5	100.1	
4. April	101.9	98.5		4. April	103.5	100.1	
5. May	102.1	98.7		5. May	103.4	100.0	
6. June	102.4	99.0		6. June	103.4	100.0	
7. July	102.7	99.3		7. July	103.3	99.9	
8. August	103.0	99.6		8. August	103.3	99.9	
9. September	103.3	99.9		9. September	103.2	99.8	
10. October	103.6	100.2		10. October	103.1	99.7	
11. November	103.9	100.5		11. November	103.1	99.7	
12. December	104.1	100.7		12. December	103.2	99.8	
1924				1926			
1. January	104.3	100.9		1. January	103.2	99.8	
2. February	104.4	101.0		2. February	103.3	99.9	
3. March	104.6	101.1		3. March	103.3	99.9	
4. April	104.7	101.2		4. April	103.4	100.0	
5. May	104.8	101.3		5. May	103.4	100.0	
6. June	104.8	101.3		6. June	103.4	100.0	
7. July	104.7	101.2		7. July	103.4	100.0	
8. August	104.5	101.1		8. August	103.4	100.0	
9. September	104.2	100.8		9. September	103.4	100.0	
10. October	104.0	100.6		10. October	103.5	100.1	
11. November	103.8	100.4		11. November	103.4	100.0	
12. December	103.6	100.2		12. December	103.4	100.0	

TABLE A 5 1 (continued)

FOR TWO-YEAR PERIOD BEGINNING	1929	1926, 1927, 1928	FOR TWO-YEAR PERIOD BEGINNING	1929	1926, 1927, 1928
1927			1929		
1. January	103.4	100.0	1. January	103.8	100.4
2. February	103.4	100.0	2. February	104.4	101.0
3. March	103.3	99.9	3. March	104.9	101.4
4. April	103.3	99.9	4. April	105.5	102.0
5. May	103.2	99.8	5. May	106.0	102.5
6. June	103.0	99.6	6. June	106.6	103.1
7. July	102.9	99.5	7. July	107.2	103.7
8. August	102.7	99.3	8. August	107.8	104.2
9. September	102.5	99.1	9. September	108.6	105.0
10. October	102.3	98.9	10. October	109.4	105.8
11. November	102.1	98.7	11. November	110.4	106.8
12. December	101.9	98.5	12. December	111.3	107.6
1928			1930		
1. January	101.7	98.3	1. January	112.1	108.4
2. February	101.6	98.2	2. February	113.1	109.4
3. March	101.5	98.1	3. March	114.1	110.3
4. April	101.6	98.2	4. April	115.1	111.3
5. May	101.6	98.2	5. May	116.4	112.6
6. June	101.6	98.2	6. June	117.3	113.4
7. July	101.7	98.3			
8. August	101.9	98.5			
9. September	102.2	98.8			
10. October	102.5	99.1			
11. November	103.0	99.6			
12. December	103.4	100.0			

APPENDIX XIII

THE UNRELIABILITIES OF THE VARIOUS MEASURES USED IN THE INVESTIGATION; THE RESULTS WHICH WOULD BE OBTAINED IF PERFECTLY RELIABLE MEASURES COULD BE USED

PROBABLY not a single one of the Items 2 to 37 used in this investigation is a perfect measure of the fact which it purports to measure in every one of the boys and girls studied. Even the age is doubtless incorrect in some cases by reason of misstatement or clerical error. In the case of Items 1 to 15, for most of our problems it is the measures as they are that concern us, since they, or others as fallible as they, are what a vocational counselor would have to work with. In the case of Items 16 to 37, we should prefer to have perfect measures of the facts fallibly measured by them if we could, since it is the person's real educational success and vocational success, rather than some imperfect measures or inadequate symptoms of them, that concern us.

The unreliability of a measure for a given group may be expressed by the degree of drop below 1.00 of its correlation with the true measure ($r_{i\infty}$), or by the degree of drop below 1.00 of its correlation with another comparable measure of the same trait as fallible as itself (r_{iI}). If the two measures i and I are two random samples from strictly comparable imperfect measures, then $r_{i\infty} = \sqrt{r_{iI}}$.

We have made special investigations to measure $r_{i\infty}$ and r_{iI} in the case of few of our items, because the task was unnecessary, impossible, or not worth the expense. But the facts can often be estimated closely enough for present purposes. The measurements and estimates, with some indication of the latter's justification, follow.

Item 2a, grade reached at age 14.0. $r_{iI} = .94$ or $>$. Therefore, $r_{i\infty} = .97$ or $>$. The factors of unreliability are misstatements of age,

clerical errors, and the inference of grade status at age 14.0 from grade status a year or so earlier or later.

Item 2r, age at time of tests (reversed). $r_{ii}=.96$ or $>$. Therefore, $r_{i\infty}=.98$ or $>$. The factors of unreliability are misstatements of age and clerical errors.

Item 3, clerical intelligence. For the Age Groups, $r_{ii}=.85$ to $.92$; therefore $r_{i\infty}=.92$ to $.96$. The correlations with a second comparable clerical intelligence test will be higher than those with Item 9. We know from their varying correlations with other measures that Items 3 and 9 measure somewhat different abilities. The correlations of Item 3 with Item 9 are $.81$ for the Boys Age and $.81$ for the Girls Age Group. r_{39} will probably not be above $.92$, since the self-correlation for any such test in an age group such as these rarely reaches $.95$.

For the Grade Groups, $r_{ii}=.80$ to $.87$; $r_{i\infty}=.90$ to $.93$. The correlations of Item 3 with Item 9 in the Grade Groups are $.69$ and $.75$.

Item 4, clerical activities. For the Girls Age Group, r_{ii} = between $.80$ and $.92$; $r_{i\infty}$ = between $.90$ and $.96$. For the Grade Groups, r_{ii} = between $.75$ and $.87$; $r_{i\infty}$ = between $.87$ and $.93$.

Item 5, mechanical adroitness (Stenquist Assembly Test). For the Boys Age Group, $r_{ii}=.70$; $r_{i\infty}=.84$. For the Boys Grade Group, $r_{ii}=.60$; $r_{i\infty}=.77$. These are estimated from data of J. L. Stenquist, *Measurement of Mechanical Ability* (1923), p. 57.

Item 6, mechanical adroitness (I.E.R. Assembly Test). For the Girls Age Group, $r_{ii}=.70$; $r_{i\infty}=.84$. For the Girls Grade Group, $r_{ii}=.60$; $r_{i\infty}=.77$.

Item 7, arithmetical problems. For the Age Groups, $r_{ii}=.75$ to $.85$; $r_{i\infty}=.87$ to $.92$. For the Grade Groups, $r_{ii}=.70$ to $.80$; $r_{i\infty}=.84$ to $.89$. Estimated from facts in general concerning the reliability of tests with arithmetical problems.

Item 8, Thorndike-McCall Reading Test. For the Age Groups, $r_{II}=.80$ to $.90$; $r_{i\infty}=.89$ to $.95$. For the Grade Groups, $r_{II}=.70$ to $.80$; $r_{i\infty}=.84$ to $.89$.

Estimated from facts concerning the reliability of the Thorndike-McCall Reading Test in other groups, and the facts that in these groups, Item 8 correlates with Item 3, $.78$ and $.79$ in the Age Groups, and $.66$ and $.72$ in the Grade Groups.

Item 9, arithmetic plus reading. For the Age Groups, $r_{II}=.85$ to $.92$; $r_{i\infty}=.92$ to $.96$. For the Grade Groups, $r_{II}=.80$ to $.87$; $r_{i\infty}=.89$ to $.93$.

The evidence is the same as that in the case of Item 3 and the general facts concerning tests in arithmetic and reading.

Item 10, progress in school up to the time of the tests. For the Age Groups, $r_{II}=.92$ or $>$; $r_{i\infty}=.96$ or $>$. The factors of unreliability are clerical errors in the records and imperfections in our scale of units.

For the Grade Groups, $r_{II}=.94$ or $>$; $r_{i\infty}=.97$ or $>$. The factors of unreliability are clerical errors in the records.

Item 11, average conduct mark. For the Age Groups, $r_{II}=.96$ or $>$; $r_{i\infty}=.98$ or $>$. The only factor of any appreciable unreliability is a possible shift in the standard from early to late grades, and the influence of clerical errors. The latter will be slight, because each individual is measured by the average of 6 or more conduct marks.

For the Grade Groups, $r_{II}=.99$ or $>$; $r_{i\infty}=>.99$. The only factors are clerical errors, which should be of very slight influence.

Item 12, average "works" (scholarship) mark. For the Age Groups, $r_{II}=.96$ or $>$; $r_{i\infty}=.98$ or $>$. For the Grade Groups $r_{II}=.99$ or $>$; $r_{i\infty}=>.99$.

The case is the same as with Item 12. It will be understood that the perfect measures in Items 11 and 12 are the averages of the marks actually assigned by the teachers. If we meant the averages of the marks that would have been assigned by *the same set* of teachers

the correlations would drop a point or two. If we meant the pupil's actual conduct and scholarship as measured by some infallible as well as uniform judge, the correlations would drop still further.

Item 13, average attendance. For the Age Groups, $r_{II} = .99$; $r_{i\infty} = > .99$. For the Grade Groups, $r_{II} = .99$; $r_{i\infty} = > .99$.

Item 14, relative superiority of Item 3 over Item 5 (6 for girls). r_{II} is probably about .55, and $r_{i\infty}$ about .74.

Item 15, relative superiority of Item 4 over Item 5 (6 for girls). r_{II} is probably about .53, and $r_{i\infty}$ about .73.

If there had been no factors of unreliability in the school records (Items 2, 10, 11, 12, and 13) and if each candidate had been tested with a hundred tests like 3, a hundred like 4, a hundred like 5, etc., the predictive value of the resulting "true" scores would have been raised by small percentages (0 to 10). This is of no practical importance. The predictive values are so low that a rise of even 10 per cent would not justify spending time even in one additional trial of the test.

Item 16, age at leaving school. For all groups, $r_{i\infty} = .97$ or $>$. The factors causing unreliability are misstatement by school authorities or by pupils, clerical errors, and possible instances of pupils who left school, but later returned without our discovering the fact.

Item 17, half-years in school. For the Age Groups, $r_{i\infty} = .95$ or $>$. For the Grade Groups, $r_{i\infty} = .97$ or $>$.

The factors causing unreliability are those for Item 16 plus errors in the records of double promotions and failures of promotion and grade reached at the time of leaving school.

Item 18, grade reached at leaving school. For all groups, $r_{i\infty} = .99$ or $>$. The factors of unreliability are clerical errors and occasional possible errors of estimate when the individual attended a trade school or private school or when he left between June and December and the record was ambiguous as to whether he would have been promoted to the next grade had he returned to school.

Item 19, school progress after the time of the tests. Our records of the number of semesters in school after the time of the tests and the number of promotions, failures of promotion, double promotions, etc., during that time are highly reliable. But as measures of the progress that the pupils would have made if they had all remained for the same number of semesters and for at least six, they are highly unreliable. There are some cases who remained zero semesters and made zero gain in grade, for whom we could only guess. There are many who remained only one semester. Whether they did or did not fail of promotion in that one trial decides their score. Our scale, which makes the best allowance it can for the difficulty of promotion in the different grades, introduces another factor of unreliability. The correlations of rate of progress after the tests with rate of progress up to the time of the tests are only .23, .18, .17, and .18, in the four groups.

In view of these facts, we estimate that if by a miracle the boys and girls of the Grade Groups could have been a thousand replicas, each of whom could have continued in school six or eight semesters, the correlation between the obtained rate of progress after the tests and the average rate for the thousand replicas would have been only about .35. For the Age Groups the corresponding correlation would have been about the same.

From the intercorrelations themselves we have support for this estimate as follows:

Let B equal the "true" rate of progress in school up to grade 8B (i.e., the rate that would obtain if the pupil in a thousand replicas could have had a thousand rates, which were then averaged).

Let C equal the "true" rate in three or four years thereafter.

Let b and c be the obtained rates, our Items 10 and 19. r_{bB} is probably much larger than r_{cC} , since on the average about four times as many years are used in measuring b as in measuring c. r_{BC} is probably very near 1.00 since it is the same fact for the same person at two neighboring ages. We will assume that

$$\begin{aligned} r_{bB} &= 1\frac{1}{2} \text{ times } r_{cC} \\ r_{BC} &= .95 \end{aligned}$$

Then, using the average for the Grade Groups (.175) for r_{bc} , we have a well-known formula

$$.95 = \frac{.175}{1.5 (r_{cC})^2}$$

whence $r_{cC} = .35$.

If we use .90 for r_{BC} and the same ratio for r_{bB} and r_{cC} , we have .36.

If we use .95 with 1.4 as the ratio, we have .36.

If we use .90 with 1.4 as the ratio, we have .37.

Even with .80 for r_{BC} and 1.2 for $\frac{cC}{bB}$, r_{cC} is only .43.

Item 20, average scholarship marks after the time of the tests.

In spite of every effort, the score for scholarship after the time of the tests is a very unreliable measure of the average scholarship from a thousand duplicates of each individual, each set of them taking the same courses of, say, grades 9 and 10, in the same high school, according to our miracle. There are probably very few errors in our records, and we have taken pains to allow for differences between grades and between schools, but there are many records of only one or two semesters, and some of zero semesters, whose scholarship after the tests has to be inferred from scholarship before the tests; and the errors of judgment, chance and systematic, due to differences in the courses taken and the teachers who taught them, cannot be avoided. We estimate that the correlation between our actual measures and the true scholarship measured by such a miracle would be little over .40 for the Grade Groups and about the same for the Age Groups. Support for this estimate comes from the correlations with scores 3 and 9 as follows:

The correlation, in an 8B Grade Group, of perfect measures of whatever is measured by intelligence tests such as our Items 3 and 9, and perfect measures of scholarship (the average scholarship of the thousand incarnations of our miracle), either in grades 3 to 8 or in grades 9 to 12, is at least .70 and probably not over .90.

Let I mean a perfect measure of what is measured inadequately by our intelligence scores 3 and 9.

Let E mean a perfect measure of scholarship up to grade 8.

Let S mean a perfect measure of scholarship in grades 9 to 12.

Let e mean our Item 12.

Let s mean our Item 20.

The correlation between Items 3 and 9 in grade 8B (average for Grade Groups) is .72; therefore, $r_{i3(\text{or } 9)} = .85$.

The correlation between Items 3 (or 9) and 20 is .26 (average of .28, .26, .23, and .28 as found for Grade Groups).

Using .80 for r_{IS} we have

$$.80 = \frac{.26}{.85 r_{sS}}$$

From this, $r_{sS} = .38$.

Even if we use .70 for r_{IS} , r_{sS} is only .44.

Support comes also from the correlation of Item 12 with Item 20, as follows:

Let I, E, S, e, and s, mean as above.

Since e correlates with Item 3 to the extent of .58 and .59 (Boys and Girls Grade Groups) and with Item 9 to the extent of .56 and .61 (Boys and Girls Grade Groups); and since the self-correlations of Items 3 and 9 in the Grade Groups are not over .90, $r_{e'e''}$ must be at least .40 and r_{eE} at least .63. If r_{IE} is taken as .80, $r_{e'E''} = .60$, and $r_{eE} = .77$. The correlations of e with Item 3 in the Grade Groups are .32 and .29. Then, if $r_{ES} = .90$, we have, using .77 for r_{eE} ,

$$.90 = \frac{.305}{.77 r_{sS}}$$

From which, $r_{sS} = .44$.

If Items 19 and 20 could be replaced by measures of each individual's "true" rate of progress and "true" scholarship in high school as measured by our miracle, the value of Items 2a (or 2r), 10, 12, 3, and 9, in predicting later progress and scholarship, would rise notably. For the Grade Groups, for example, if we use .38 and .42 as the value of $r_{i\infty}$ for school progress after the tests and high-school scholarship, we should have the following changes in the correlations:

<i>Items</i>	<i>Boys</i>	<i>Girls</i>
2r with 19	From .09 to .24	From .23 to .61
2r with 20	From .20 to .48	From .17 to .40
3 with 19	From .13 to .34	From .30 to .79
3 with 20	From .23 to .55	From .28 to .67
9 with 19	From .14 to .37	From .27 to .71
9 with 20	From .28 to .67	From .26 to .62
10 with 19	From .17 to .44	From .18 to .47
10 with 20	From .26 to .62	From .20 to .48
12 with 19	From .21 to .55	From .23 to .61
12 with 20	From .32 to .76	From .29 to .69

Item 21, educational success (Items 18+19+20). We make no estimate of the unreliability of Item 21, since it has not been used as a basis for conclusions in our work.

Item 22, average annual earnings at age 20.0 to 22.0. The reliability of Item 22 as a measure of the actual earnings at age 20.0 to 22.0 can be estimated from the facts of Appendix VII. It was there shown that the correlation between our record of duration for a job and the employer's record was .90 for jobs averaging about one year and a half. Our record of weekly salary at the job correlated .84 with the employer's. It is then reasonable to set $r_{i\infty}$ for Item 22 at about .90 (or a little higher, if we assume that the employers' records are themselves sometimes in error).

Item 30, average annual earnings at age 18.0 to 20.0. The $r_{i\infty}$ may be set as about .90 from the facts given for Item 22.

Item 23, average level of jobs at age 20.0 to 22.0. In Appendix VII it is shown that our measures correlate with the levels of representative jobs measured from the employers' records of the nature of the work done to an average extent of .60. The correlation of our measures of average level over a two-year period may then be expected to correlate with the true level to an extent of .70 or more.

Item 31, average level of jobs at age 18.0 to 20.0. From the facts given for Item 23, $r_{i\infty}$ may be set as .70 or $>$.

Items 24 and 32, average liking for jobs at ages 20.0 to 22.0 and 18.0 to 20.0. We have no checks on the statement of a worker about his liking for the work. On general grounds, we should expect a person to know how he liked what he was doing eight hours a day well enough to produce a correlation over a two-year period with an omniscient and impartial judge's records of .70 or more, or to correlate by .50 or more with some independent estimate of his likings (such as an intimate friend might give, or some close observer in the place of working might give).

Items 25 and 33, percentage of time employed. The facts of Appendix VII showed the correlation between our records of the duration of representative jobs and the employers' records to be .90. So we may set $r_{i\infty}$ for Items 25 and 33 at .90 to .95.

Items 26 and 34, number of changes of employer. We have no check on this. The factors producing unreliability are the errors of memory on the part of the worker and deliberate misrepresentations. Such will presumably be even rarer in respect of changes of employer than in the case of duration of employment and weekly wages. So $r_{i\infty}$ for Items 26 and 34 is near 1.00.

Items 27, 28, 29, 35, 36, and 37, relative superiority of clerical over mechanical work. These measures are, as was stated in Chapter VI, very unreliable. The correlations of Items 27 with 35, 28 with 36, and 29 with 37 for the boys and girls who worked at both clerical and mechanical jobs in both two-year periods, averaged .23, .31, and .47 respectively. The real changes in the persons from the earlier to the later period would probably not lower the correlation between perfect measures to below .90. So we may estimate r_{ii} and $r_{i\infty}$ as approximately: .26 and .51 for Items 27 and 35 (a little above for Item 27 and below for Item 35), .33 and .58 for Items 28 and 36, and .52 and .72 for Items 29 and 37.

THE INFLUENCE OF THE UNRELIABILITIES OF ITEMS 22 TO 37 UPON
VOCATIONAL PREDICTIONS

If we had perfectly exact measures of earnings in place of Items 22 and 30 the positive correlations of Items 2a, 2r, 3, 4, 5, etc., with earnings reported in Chapter VI would be raised 5 to 10 percent of their amount. The correlations with level might be raised by 20 or 25 percent, if we had perfect measures of level. The correlations with interest might be raised by 20 or 25 percent if we had perfect measures of interest.

APPENDIX XIV

A. TABLES SHOWING FREQUENCY DISTRIBUTION OF SCORES IN SCHOOL RECORDS AND TESTS

TABLE A52 shows the distributions in percentages, the means, and the standard deviations in Items 2 to 20 for all the boys and girls in the Age Groups who were followed till they left school. Table A53 gives the corresponding facts for the Boys and Girls Grade Groups.

TABLE A 5 2

Scores in Items 2 through 20. Percentage distribution for Boys Age Group (n=266) and Girls Age Group (n=200). Q=score; B=frequency for boys in percents; G=frequency for girls in percents

<i>Item 2a</i>			<i>Item 3</i>			<i>Item 4*</i>		<i>Item 5 or 6</i>		
Q	B	G	Q	B	G	Q	G	Q	B	G
5 or 3A	0.4		0	3.8	1.5	2	0.5	0	1.9	0.5
6 or 3B	1.5		4	3.8	2.5	4		8	6.0	1.0
7 or 4A	2.3	1.5	8	9.0	3.5	6		16	12.8	5.5
8 or 4B	4.1	2.0	12	7.5	3.5	8	1.0	24	11.3	9.5
9 or 5A	7.1	5.0	16	10.9	7.5	10	4.0	32	12.4	17.5
10 or 5B	11.3	4.0	20	10.9	6.5	12	5.0	40	20.7	17.0
11 or 6A	16.2	7.0	24	8.3	7.5	14	10.0	48	10.9	22.5
12 or 6B	11.7	12.5	28	6.7	12.0	16	7.0	56	9.4	13.5
13 or 7A	14.7	13.0	32	8.3	6.5	18	9.0	64	6.7	8.0
14 or 7B	6.4	13.5	36	7.5	12.0	20	12.5	72	4.1	4.0
15 or 8A	12.4	18.0	40	8.3	9.5	22	11.0	80	3.4	1.0
16 or 8B	8.6	13.5	44	6.7	10.0	24	9.5	88	0.4	
17 or 9A	2.3	6.5	48	3.0	4.0	26	7.5			
18 or 9B	1.1	3.5	52	1.5	6.0	28	7.5			
			56	2.3	4.5	30	7.5			
			60	1.1	3.0	32	4.5			
			64		1.5	34	2.0			
			68	0.4	0.5	36	1.0			
						38				
						40	0.5			
Av.	12.1	13.6	27.1	34.5		22.4		41.8	46.2	
SD	2.6	2.6	14.7	15.2		6.7		19.2	14.9	

* This test was not given to the Boys Age Group.

TABLE A 5 2 (continued)

<i>Item 7</i>			<i>Item 8</i>			<i>Item 9</i>			<i>Item 10</i>		
Q	B	G	Q	B	G	Q	B	G	Q	B	G
0	4.5	5.5	20	1.5		20	0.8		0	1.1	0.5
4	6.0	5.0	24	1.5	0.5	25	1.1	2.0	1	2.6	
8	7.5	9.0	28	6.5	5.5	30	3.0	2.0	2	1.1	2.0
12	9.8	9.5	32	11.7	7.5	35	3.4	2.5	3	5.3	2.0
16	12.8	6.5	36	13.9	12.0	40	4.5	4.0	4	11.3	2.5
20	16.2	16.5	40	17.3	14.5	45	6.7	6.5	5	13.2	3.5
24	12.8	12.0	44	10.9	13.5	50	8.3	9.0	6	16.5	11.0
28	12.4	15.5	48	10.9	8.5	55	10.2	8.0	7	12.0	9.5
32	11.3	8.5	52	10.5	15.0	60	11.7	4.5	8	10.9	11.5
36	5.6	11.0	56	6.4	13.5	65	9.4	8.5	9	10.9	16.5
40	0.8	1.0	60	5.6	5.5	70	9.4	10.0	10	9.8	27.0
44			64	1.1	4.0	75	6.0	9.5	11	4.9	4.5
48	0.4		68	1.1		80	8.3	7.0	12	0.4	7.0
			72	1.1	0.5	85	6.7	10.0	13		2.0
						90	3.4	10.0	14		0.5
						95	3.4	2.5			
						100	2.3	3.5			
						105	1.1	0.5			
						110	0.4				
Av.	21.4	22.3	44.3	46.9		65.7	69.2		6.6	8.5	
SD	10.0	10.5	10.3	9.9		18.6	18.9		2.5	2.5	

TABLE A 5 2 (*continued*)

<i>Item 11</i>			<i>Item 12</i>			<i>Item 13</i>			<i>Item 14</i>		
Q	B	G	Q	B	G	Q	B	G	Q	B	G
12	0.4		8	1.1	1.0	58	0.4		12	0.8	
16	0.4		12	0.8	0.5	60			16	1.1	
20	2.6		16	2.3	1.5	62			20	3.0	
24	2.6	1.0	20	7.1	4.0	64			24	2.6	1.0
28	5.3	1.0	24	11.7	5.0	66			28	7.1	2.5
32	4.9	1.0	28	15.0	11.0	68	0.4		32	9.0	10.0
36	7.9	4.5	32	19.9	10.0	70	0.4		36	13.9	13.5
40	16.2	3.0	36	12.4	20.5	72	0.8	1.5	40	12.4	20.0
44	20.7	9.0	40	14.3	18.0	74	0.8	0.5	44	10.5	19.5
48	14.7	11.5	44	9.0	15.0	76	1.9	1.0	48	9.4	14.0
52	11.7	29.5	48	3.8	7.5	78	1.1	1.5	52	8.6	10.5
56	7.9	21.0	52	2.3	3.0	80	1.5	1.5	56	8.3	6.0
60	4.9	18.5	56	0.4	3.0	82	3.8	4.0	60	9.0	2.0
						84	4.9	4.0	64	2.6	1.0
						86	4.5	6.0	68	1.1	
						88	8.6	5.5	72		
						90	9.0	13.0	76	0.4	
						92	15.0	16.0			
						94	17.7	20.0			
						96	17.7	19.0			
						98	11.7	6.5			
Av.	44.5	52.6	34.1	38.0		91.5	91.5		44.2	44.5	
SD	9.5	7.2	8.9	9.2		6.3	5.5		12.2	7.9	

TABLE A 5 2 (continued)

Item 15 *		Item 16			Item 17		
Q	G	Q	B	G	Q	B	G
28	1.5	12.8		0.5	9		1.0
32	1.5	13.2	0.4	1.5	10		0.5
36	5.5	13.6	1.1	0.5	11	0.4	0.5
40	12.5	14.0	3.8	2.5	12		1.0
44	22.0	14.4	7.9	7.0	13		1.0
48	16.5	14.8	19.9	16.0	14	0.4	4.0
52	18.0	15.2	16.5	17.5	15	3.4	5.0
56	12.0	15.6	13.5	12.0	16	14.7	14.5
60	9.0	16.0	15.8	18.0	17	12.8	12.5
64	1.0	16.4	8.3	9.5	18	22.2	20.0
68	0.5	16.8	4.5	4.5	19	15.8	11.0
		17.2	2.3	4.0	20	10.2	13.0
		17.6	0.4	4.0	21	10.2	4.5
		18.0	1.1	0.5	22	3.4	6.5
		18.4	2.3	0.5	23	1.5	1.0
		18.8	0.4	0.5	24	2.3	2.0
		19.2			25	1.1	1.0
		19.6	.04	1.0 †	26	0.4	0.5
		20.0			27	0.4	
		20.4	1.1		28	0.4	0.5
		20.8			29	0.4	
		21.2			30		
		21.6			31		
		22.0			32		
		22.4			33		
		22.8			34		
		23.2			35	0.4	
		23.6	0.4				
Av.	49.5		15.8	15.8		18.7	18.1
SD	7.5		1.2	1.1		2.6	2.9

* Item 15 uses Item 4, a test given to the Boys Age Group.

† One girl of the 200 remained in school till 21.0 and graduated from a three-year course in the teachers training school. But we have recorded her status as of age 19.9, partly for convenience in computation, and partly because it seemed more reasonable to reduce the weight this one extreme case would have in the correlations with scores for Items 16, 17, 18, and 21, by reason of her continuance in school.

TABLE A 5 2 (*continued*)

<i>Item 18</i>			<i>Item 19</i>			<i>Item 20</i>		
Q	B	G	Q	B	G	Q	B	G
8 or 4B		0.5	2		1.0	32	0.4	
9 or 5A	1.5	1.0	3	3.4		34		
10 or 5B	3.8	2.5	4	2.6	1.0	36		
11 or 6A	4.5	1.0	5	15.0	4.0	38		
12 or 6B	7.1	3.5	6	5.6	0.5	40	0.4	
13 or 7A	19.9	8.0	7	13.9	4.5	42		
14 or 7B	11.3	3.5	8	13.9	9.5	44	0.8	0.5
15 or 8A	3.8	3.0	9	2.3	4.0	46		
16 or 8B	4.1	4.5	10	33.8	62.0	48		
17 or 9A	21.4	21.0	11		1.0	50	10.5	2.5
18 or 9B	6.4	9.5	12	4.1	5.0	52	1.1	
19 or 10A	7.1	25.0	13	3.4	2.0	54	2.6	1.0
20 or 10B	2.6	4.5	14	0.4	1.5	56	8.6	0.5
21 or 11A	1.9	5.5	15	0.4	1.0	58	8.3	2.5
22 or 11B		3.0	16	0.8	1.0	60	11.7	3.5
23 or 12A		1.5	17	0.4	1.5	62	14.3	4.5
24 or 12B	0.8		18		0.5	64	23.7	31.0
25 or 13A	2.6	2.0				66	6.4	22.0
26 or 13B						68	4.5	14.0
27 or 14A		0.5				70	3.8	6.0
28 or 14B						72	0.8	7.0
29 or 15A	0.4					74	1.9	4.0
30 or 15B						76		0.5
31 or 16A	0.4					78		
32 or 16B						80	0.4	
33 or 17A	0.4					82		
						84		0.5
Av.	15.5	17.3		8.2	9.8		61.0	66.5
SD	3.7	3.3		2.6	2.3		6.2	4.9

TABLE A 5 3

Scores in Items 2 through 20. Percentage distribution for Boys Grade Group (n=785) and Girls Grade Group (n=905). Q= score; B= frequency for boys in percents; G=frequency for girls in percents

Item 2			Item 3			Item 4			Item 5 or 6		
Q	B	G	Q	B	G	Q	B	G	Q	B	G
11.0	0.1	0.2	0	0.2	0.2	0		0.1	0	5.2	0.7
11.5	0.8	1.1	4	0.6	0.7	2		0.6	8	7.1	2.0
12.0	3.8	5.4	8	0.9	1.0	4	0.4	0.2	16	12.7	4.4
12.5	8.0	9.6	12	1.9	1.5	6	0.5	0.8	24	11.7	8.3
13.0	12.5	12.5	16	2.8	3.3	8	1.5	1 0	32	12.9	16.6
13.5	20.6	19.1	20	4.8	4.5	10	1.4	2.7	40	14.7	19.7
14.0	16.3	16.3	24	4.6	5.7	12	3.3	2.8	48	14.3	19.1
14.5	15.1	16.0	28	5.6	7.0	14	4.5	4.8	56	8.5	14.3
15.0	9.6	10.3	32	7.9	10.1	16	6.8	6.5	64	5.6	9.1
15.5	8.0	6.2	36	10.7	9.7	18	7.3	6.6	72	4.6	4.0
16.0	3.7	2.4	40	11.8	10.9	20	6.6	10.4	80	1.9	1.1
16.5	1.1	0.6	44	11.2	8.0	22	9.3	9.8	88	0.5	0.4
17.0	0.4	0.2	48	8.8	10.6	24	10.7	10.0	96	0.1	0.2
			52	6.1	7.5	26	10.6	10.9			
			56	6.6	5.6	28	9.9	9.0			
			60	6.4	5.1	30	7.1	6.3			
			64	4.2	3.1	32	5.9	5.5			
			68	1.9	2.2	34	5.2	4.1			
			72	1.0	0.9	36	3.6	4.0			
			76	0.4	1.3	38	2.0	1.7			
			80	0.9	1.0	40	0.9	1.1			
			84	0.4		42	1.3	0.6			
			88			44	0.9	0.1			
						46		0.4			
						48	0.3	0.1			
						50	0.1				
Av.	41.5	40.4	43.0	42.4		25.0	24.2		39.5	46.9	
SD	10.7	10.4	15.2	15.3		7.8	7.7		20.1	15.8	

TABLE A 5 3 (*continued*)

<i>Item 7</i>			<i>Item 8</i>			<i>Item 9</i>			<i>Item 10</i>		
Q	B	G	Q	B	G	Q	B	G	Q	B	G
0	0.2	3.6	16		0.1						
4	0.3	2.5	20		0.1	20			0		
8	2.4	7.3	24	0.6	0.3	25		0.2	1		
12	4.2	9.9	28	1.4	1.3	30	0.1	0.3	2		
16	9.3	12.7	32	4.1	4.6	35	0.6	1.2	3	0.1	0.1
20	12.6	12.3	36	6.4	9.1	40	1.4	2.8	4	0.4	
24	19.5	15.1	40	9.9	12.7	45	1.5	3.4	5	1.3	1.0
28	18.4	13.5	44	12.0	11.4	50	3.3	5.4	6	2.7	2.8
32	15.2	10.8	48	13.0	13.7	55	4.6	5.7	7	9.3	8.0
36	8.4	6.7	52	14.5	14.6	60	8.5	9.1	8	10.6	8.7
40	5.6	4.2	56	13.5	12.9	65	8.7	9.6	9	22.8	22.5
44	2.2	1.3	60	11.3	8.6	70	9.8	10.3	10	20.4	24.0
48	1.0	0.2	64	7.3	5.2	75	11.1	8.8	11	19.1	20.0
52	0.4		68	3.9	3.3	80	9.8	9.5	12	6.0	8.3
56	0.1		72	1.4	1.4	85	11.1	8.3	13	5.6	3.6
			76	0.4	0.3	90	8.7	8.4	14	1.5	0.9
			80		0.1	95	7.9	5.4	15	0.1	0.1
			84	0.3		100	6.1	5.3	16	0.1	
						105	3.4	3.0			
						110	1.5	2.1			
						115	0.6	0.9			
						120	0.6	0.1			
						125	0.5	0.1			
Av.	27.9	23.4	51.8	50.4		79.8	73.8		9.6	9.7	
SD	8.6	10.2	10.3	10.2		17.1	18.5		1.9	1.7	

TABLE A 5 3 (continued)

Item 11			Item 12			Item 13			Item 14		
Q	B	G	Q	B	G	Q	B	G	Q	B	G
12			4	0.1		60			20		0.3
16	0.1		8			62			24	0.9	0.9
20			12			64		0.1	28	1.1	2.0
24	0.1		16		0.2	66			32	2.2	4.8
28	0.8		20	0.3	0.3	68			36	5.1	8.7
32	2.0	0.7	24	0.5	1.8	70			40	5.2	12.8
36	3.8	1.5	28	4.3	4.2	72	0.1	0.1	44	8.4	17.5
40	11.2	3.1	32	11.0	11.4	74	0.1	0.1	48	10.2	17.2
44	15.4	6.6	36	20.3	18.1	76	0.1	0.1	52	9.9	17.2
48	17.6	11.5	40	23.1	21.7	78	0.5	0.3	56	11.5	9.6
52	20.6	18.3	44	19.1	14.6	80	0.1	0.6	60	12.6	4.5
56	20.1	35.0	48	13.0	11.3	82	0.5	0.8	64	9.9	3.1
60	7.9	23.2	52	5.0	9.7	84	2.0	1.2	68	9.0	1.2
64			56	2.4	5.2	86	1.8	3.2	72	6.9	0.1
68	0.1		60	0.9	1.3	88	5.2	6.5	76	3.7	0.1
72						90	9.2	11.0	80	1.8	
76	0.1					92	22.0	21.7	84	1.1	
						94	29.7	24.9	88	0.1	
						96	15.9	18.3	92	0.1	
						98	12.7	11.0	96	0.1	
Av.	50.4	55.1	42.0	42.7		93.6	93.3		57.3	48.0	
SD	7.1	5.1	6.8	7.9		3.6	3.8		12.7	8.9	

TABLE A 5 3 (continued)

Item 15			Item 16			Item 17			Item 18		
Q	B	G	Q	B	G	Q	B	G	Q	B	G
20	0.1	0.1	12.8	0.3		13	0.8	0.1	8A		0.2
24	0.3	0.3	13.2	0.5	0.8	14	1.5	0.6	8B	3.1	1.5
28	0.1	1.1	13.6	1.5	2.0	15	2.6	4.0	9A	37.1	33.4
32	1.4	3.3	14.0	3.8	6.2	16	6.2	7.8	9B	7.4	9.7
36	2.5	5.6	14.4	9.0	9.8	17	12.5	16.1	10A	13.5	22.3
40	4.3	9.7	14.8	9.4	14.4	18	12.2	17.8	10B	7.9	7.0
44	5.9	13.5	15.2	9.9	15.5	19	12.2	14.7	11A	5.5	3.2
48	9.3	17.7	15.6	10.3	11.8	20	11.5	10.3	11B	2.9	2.2
52	9.4	16.7	16.0	12.0	9.3	21	10.6	5.4	12A	1.9	0.7
56	11.3	16.3	16.4	10.2	7.7	22	7.3	4.8	12B	1.8	2.0
60	10.4	8.2	16.8	6.5	5.7	23	4.7	3.9	13A	12.6	11.4
64	10.2	4.5	17.2	6.6	5.3	24	5.2	5.3	13B		
68	9.0	2.1	17.6	4.3	1.8	25	2.9	2.0	14	0.4	0.6
72	9.7	0.8	18.0	3.1	1.8	26	2.3	1.3			
76	6.9		18.4	2.5	1.0	27	1.0	0.6	15	0.8	0.2
80	3.9		18.8	1.7	0.9	28	1.0	0.9			
84	3.7		19.2	1.0	1.0	29	1.3	1.3	16	1.3	1.9
88	0.8	0.1	19.6	1.0	0.9	30	1.2	2.1			
92	0.3		20.0	0.8	1.1	31	0.9	0.7	17	3.8	3.4
96	0.4		20.4	0.9	0.8	32	1.3	0.3			
			20.8	0.6	0.8	33	0.9	0.1	18	0.3	
			21.2	1.0	1.0						
			21.6	0.9	0.3						
			22.0	0.8	0.1						
			22.4	0.3							
			22.8	0.3							
			23.2	0.3							
			23.6	0.4	0.1						
Av.	61.7	51.0		16.5	16.0		20.4	19.7		20.1	20.0
SD	13.3	8.9		1.9	1.6		3.9	3.5		4.2	4.0

TABLE A 5 3 (continued)

<i>Item 19</i>			<i>Item 20</i>		
Q	B	G	Q	B	G
0	0.1		16	0.1	
1			20		0.1
2			24		
3	0.5	0.2	28	0.3	
4	1.7	0.6	32	0.3	
5	8.7	3.1	36	0.1	
6	6.2	1.3	40	0.4	0.3
7	5.6	2.4	44	0.6	
8	10.4	8.6	48	2.2	0.9
9	2.7	1.1	52	3.7	0.9
10	51.0	67.2	56	3.8	0.8
11	2.5	0.9	60	16.3	5.5
12	8.2	12.3	64	29.9	24.9
13	1.5	1.1	68	28.7	29.2
14	0.4	1.1	72	9.0	24.6
15	0.1		76	3.6	7.3
16	0.1	0.1	80	0.6	4.3
17			84	0.4	1.2
18			88	0.1	0.1
19		0.1			
20	0.3	0.1			
Av.	9.1	9.9		65.7	69.7
SD	2.3	1.7		6.8	6.1

B. TABLES SHOWING FREQUENCY DISTRIBUTION
OF VOCATIONAL STATUS OF SUBJECTS WITH
HISTORIES AT AGE 22.0 COMPLETE TO JULY 1, 1932

THE VOCATIONAL status of those subjects who were primarily at work at age 18.0 to 22.0 is shown in Tables A54 to A59. The data presented have been corrected for changes in the value of the dollar, prevailing wage rate, and general frequency of unemployment, but not for the tendency of employees to overstate their wages and duration of employment and level of job. The facts presented in Appendix VII will enable anyone to make such shifts as he thinks most probably correct. What these will be will depend upon one's judgment concerning a) the extent to which the employer's records as well as the employee's may be fallible, b) the correlation between amount of earnings and amount of overstatement, c) the correlation between the amount of overstatement at age 20.0 to 22.0 and that at age 18.0 to 20.0.

The facts in which we are chiefly interested, the variability in earnings, level, and percentage of time employed, will not be greatly altered by any reasonable corrections.

TABLE A 5 4

Average earnings per year at age 20.0 to 22.0 classified by type of work.

All groups

EARNINGS	BOYS AGE GROUP				GIRLS AGE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
Under								
\$200	1			1			1	1
\$200	2	2		4		1		1
400	6		5	11	2		2	4
600	6	1	5	12	8	4	1	13
800	5		14	19	10	6	1	17
1,000	13	5	9	27	6	12	5	23
1,200	12	11	8	31	7	12	7	26
1,400	10	3	5	18		9	1	10
1,600	5	4	1	10		1		1
1,800	4	2	2	8			1	1
2,000	2	1	5	8				
2,200	2	3		5				
2,400		1	1	2		1		1
2,600	1			1				
2,800								
3,000						1		1
3,200	1			1				
3,400								
3,600						1		1
3,800								
4,000								
4,200								
4,400								
4,600								
4,800								
5,000								
n	70	33	55	158	33	48	19	100
Av.	\$1,260	\$1,446	\$1,180	\$1,271	\$953	\$1,287	\$1,089	\$1,134
SD	567	505	477	533	239	556	397	476

TABLE A 5 4 (continued)

EARNINGS	BOYS GRADE GROUP				GIRLS GRADE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
Under								
\$200		1		1	2	1		3
\$200	1	2	2	5	5	3	3	11
400		5	6	11	5	4	9	18
600	3	2	9	14	15	8	6	29
800	12	17	21	50	29	24	15	68
1,000	20	25	31	76	32	54	21	107
1,200	34	50	23	107	21	56	11	88
1,400	19	32	25	76	6	27	1	34
1,600	19	19	19	57	3	18	1	22
1,800	15	16	9	40	2	3		5
2,000	10	6	9	25				
2,200	1	7	2	10				
2,400	1	2	3	6		1		1
2,600	1	5	3	9	1			1
2,800	1			1				
3,000			1	1				
3,200	2			2			1	1
3,400								
3,600								
3,800								
4,000		1	1	2				
4,200								
4,400								
4,600								
4,800								
5,000	1			1				
n	140	190	164	494	121	199	68	388
Av.	\$1,513	\$1,444	\$1,378	\$1,442	\$1,024	\$1,215	\$985	\$1,115
SD	557	506	547	537	370	329	413	370

TABLE A 5 5

Level of work at age 20.0 to 22.0 classified by type of work. All groups.
Decimal points omitted

LEVEL SCORE	BOYS AGE GROUP				GIRLS AGE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10	2		4	6	3			3
14	1			1		1		1
18	20	13	25	58	20	15	10	45
22	11	2	7	20	3	2		5
26	10	3	5	18	1	3	1	5
30	24	9	11	44	6	22	7	35
34	1	2		3		1	1	2
38	1	3	2	6		4		4
42		1		1				
46			1	1				
50								
54								
58								
62								
66								
70								
n	70	33	55	158	33	48	19	100
Av.	26	28	24	26	22	28	25	26
SD	5.9	7.4	7.2	6.8	5.5	6.7	6.1	6.8

TABLE A 5 5 (*continued*)

LEVEL SCORE	BOYS GRADE GROUP				GIRLS GRADE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10	3	1	1	5	6		1	7
14	1	1	6	8	2		4	6
18	43	66	48	157	79	53	43	175
22	8	19	24	51	4	8	5	17
26	17	22	24	63	4	12	4	20
30	53	62	48	163	22	106	9	137
34	2	6	5	13		8		8
38	11	12	7	30	3	11	2	16
42								
46		1	1	2		1		1
50	2			2	1			1
54								
58								
62								
66								
70								
n	140	190	164	494	121	199	68	388
Av.	28	27	27	27	23	29	23	26
SD	7.3	6.6	6.4	6.8	6.5	6.2	5.6	6.9

TABLE A 5 6

Interest in work at age 20.0 to 22.0 classified by type of work. All groups. Decimal points omitted

INTEREST SCORE	BOYS AGE GROUP				GIRLS AGE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10								
14								
18	2			2		1		1
22								
26		1		1	1			1
30	1	1		2				
34	2	1	1	4		1		1
38	23	10	22	55	12	7	2	21
42	2	1	3	6	1	2		3
46	2	2	2	6				
50	6		6	12	1	1	1	3
54	1	2	1	4		2		2
58	22	14	15	51	14	27	12	53
62	3		2	5	2			2
66	1			1		2		2
70	5	1	3	9	2	5	4	11
n	70	33	55	158	33	48	19	100
Av.	51	50	50	50	52	56	60	56
SD	12.2	11.0	10.4	11.4	11.5	11.0	8.7	11.1

TABLE A 5 6 (*continued*)

INTEREST SCORE	BOYS GRADE GROUP				GIRLS GRADE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10						1		1
14								
18	4	8	6	18	1	1		2
22	1	1	2	4				
26	5	1	6	12			1	1
30	5	1	4	10		1	1	2
34	2	3	3	8			2	2
38	52	58	43	153	37	32	12	81
42	9	6	7	22	2	4	2	8
46	5	5	11	21	8	8	2	18
50	4	11	13	28	6	11	4	21
54	1	6	8	15	5	8	9	22
58	45	75	50	170	48	111	26	185
62	2	1	4	7	2	4	2	8
66		4	2	6	1	6	1	8
70	5	10	5	20	11	12	6	29
n	140	190	164	494	121	199	68	388
Av.	47	51	49	49	53	56	54	55
SD	12.2	12.4	12.3	12.4	11	9.8	10.7	10.4

TABLE A 5 7

Average earnings per year at age 18.0 to 20.0 classified by type of work.
All groups

EARNINGS	BOYS AGE GROUP				GIRLS AGE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
Under								
\$200	1			1				
\$200	3	1	2	6	1	1		2
400	4		1	5	3	1	2	6
600	9	3	11	23	6	2	3	11
800	16	7	16	39	14	19	3	36
1,000	13	12	11	36	3	16	8	27
1,200	11	5	6	22	4	4	2	10
1,400	5	4	4	13		2		2
1,600	5	1	2	8			1	1
1,800	1	1		2		1		1
2,000	1		1	2				
2,200	1			1				
2,400								
2,600								
2,800								
3,000						1		1
3,200								
3,400								
3,600						1		1
3,800								
4,000								
4,200								
4,400								
4,600								
4,800								
5,000								
n	70	34	54	158	31	48	19	98
Av.	\$1,079	\$1,118	\$1,009	\$1,063	\$872	\$1,117	\$1,003	\$1,017
SD	421	311	342	376	230	535	310	433

TABLE A 5 7 (continued)

EARNINGS	BOYS GRADE GROUP				GIRLS GRADE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
Under								
\$200		1		1	2	1		3
\$200	1	2	3	6	2		3	5
400	3	3	7	13	11	10	9	30
600	8	14	28	50	14	20	10	44
800	25	52	39	116	46	49	19	114
1,000	47	43	41	131	26	63	22	111
1,200	21	25	15	61	5	24	1	30
1,400	12	13	11	36	3	14		17
1,600	7	9	6	22	2			2
1,800	4	8	4	16	1	1		2
2,000	2	1	1	4			1	1
2,200			2	2				
2,400	4	1		5				
2,600		1		1	1			1
2,800								
3,000		1		1				
3,200								
3,400	1			1				
3,600								
3,800								
4,000								
4,200								
4,400								
4,600								
4,800								
5,000	1			1				
n	139	181	160	480	121	194	67	382
Av.	\$1,248	\$1,151	\$1,054	\$1,147	\$946	\$1,040	\$887	\$983
SD	541	392	366	440	334	265	294	300

TABLE A 5 8

Level of work at age 18.0 to 20.0 classified by type of work. All groups.
 Decimal points omitted

LEVEL SCORE	BOYS AGE GROUP				GIRLS AGE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10	5		2	7	3		1	4
14	3	1	8	12			1	1
18	29	11	20	60	22	21	9	52
22	10	3	14	27	1	4	4	9
26	2	8	2	12	2	2	2	6
30	19	7	6	32	3	18	2	23
34	2	2		4		1		1
38		2	2	4		2		2
42								
46								
50								
54								
58								
62								
66								
70								
n	70	34	54	158	31	48	19	98
Av.	24	27	23	24	21	26	22	24
SD	6.4	6.3	6.0	6.5	4.8	6.3	4.9	6.1

TABLE A 5 8 (*continued*)

LEVEL SCORE	BOYS GRADE GROUP				GIRLS GRADE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10	8	1	5	14	7	1	4	12
14	3	4	7	14	4		3	7
18	64	93	73	230	84	63	43	190
22	22	20	33	75	4	17	2	23
26	7	13	11	31	5	13	6	24
30	27	42	28	97	14	94	9	117
34	4	5	2	11	1	3		4
38	3	3	1	7	2	3		5
42								
46								
50	1			1				
54								
58								
62								
66								
70								
n	139	181	160	480	121	194	67	382
Av.	24	24	23	24	22	27	22	25
SD	6.8	5.9	5.5	6.0	5.5	5.8	5.2	6.2

TABLE A 5 9

Interest in work at age 18.0 to 20.0 classified by type of work. All groups. Decimal points omitted

INTEREST SCORE	BOYS AGE GROUP				GIRLS AGE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10								
14								
18	1		1	2				
22		1	1	2				
26		1		1				
30		1	1	2				
34	1		2	3		1		1
38	23	9	17	49	8	9	3	20
42	1	2	3	6	2	1		3
46	2	2	6	10	2	1	1	4
50	3	1	9	13	1	3	3	7
54	8	2	1	11	2	2		4
58	21	13	11	45	14	22	8	44
62	4			4		4		4
66	4	2		6			2	2
70	2		2	4	2	5	2	9
n	70	34	54	158	31	48	19	98
Av.	52	50	48	50	53	56	57	55
SD	11	11	11	11	9.9	10	9.7	10

TABLE A 5 9 (continued)

INTEREST SCORE	BOYS GRADE GROUP				GIRLS GRADE GROUP			
	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>	<i>M</i>	<i>C</i>	<i>Other</i>	<i>All</i>
10								
14								
18	6	5	4	15		3	1	4
22	4	2	1	7		1		1
26	1	1	5	7			1	1
30	2	3	8	13	1	3		4
34		4	6	10	4	3		7
38	58	68	48	174	34	29	16	79
42	4	5	10	19	7	3	6	16
46	9	4	7	20	2	7	4	13
50	5	9	20	34	5	9	9	23
54	9	9	12	30	7	20	2	29
58	35	61	33	129	49	93	18	160
62	1	2	2	5	3	5	2	10
66		2		2	1	8	3	12
70	5	6	4	15	8	10	5	23
n	139	181	160	480	121	194	67	382
Av.	47	49	47	48	53	55	52	54
SD	12	12	11	12	11	11	11	11

INDEX

- Ability, intellectual: of group, 5f.; of girls not working outside their homes, 92f.; of girls who marry early and late, 93f.; of subjects employed by relatives, 91f.; of subjects self-employed, 92; vs. custom in the selection of employees, 108f.
- Abstract intelligence: significance of score, 33, 36; vs. mechanical adroitness, 47; vs. size as factor in employment, 111
- Abstract intelligence, predictive value of: at high levels, 67f.; differential, for clerical and mechanical work, 68, 71, 106, 116, 118; educational, 49, 114; general, 64; in multiple correlations, 111; of college group, 85f.; of deceased subjects, 91; of delinquents, 89; of evening college group, 87; of evening high school group, 89; of girls not working outside their homes, 92f.; of girls who do or do not work after marriage, 94; of girls who marry early or late, 93f., 95; of subjects employed by relatives, 91; of subjects non-cooperating, 135f.; of subjects self-employed, 92; vocational, 61
- Achievement in studies of subjects, 6
- Advantages of clerical or mechanical work for persons of given ability, 106
- Age at leaving school, 16; reliability of measure, 247
- Age at time of tests, 6; reliability of measure, 245
- Age-grade status of subjects, predictive value of, 49f.
- Allen, E. Patricia, 78, 82
- Allowance: for unemployment, 27, 200, 201; for variability and skewness, 14; for wage scales, 27, 238f.
- Arithmetic: scores, 7, 11; scores, reliability of, 245; test, 123f.
- Assembly, girls, test, 8, 11, 47 (*see also* Mechanical adroitness scores; Stenquist Assembly Test)
- Attendance: at college, 85ff., 117; at school, 7; mark, reliability of, 247; of delinquents at school, 91; value for prediction, 46
- Baumgarten, F., 73
- Birmingham Study of Vocational Prognosis, 78ff., 116f.
- Body size: vs. earnings, 108f.; vs. interest in job, 108; vs. level of work, 108; vs. selection by employers, 111
- Boys: Age Group, 5, 8, 17, 23, 28, 33, 36, 41, 44, 45, 52, 57, 70f., 84, 85, 86, 87, 89, 97, 103, 104, 105, 111, 130f., 209, 222, 223, 245, 246, 247, 248, 249, 250; Grade Group, 5, 17, 23, 28, 44, 45, 52, 57, 70f., 84, 86, 87, 89, 97, 103, 104, 105, 106, 111, 130f., 170, 209, 222, 223, 245, 246, 247, 248, 249, 250
- Bureau: of Marriage Licenses, 177; of Motor Vehicles, 177; of School Census, 176
- Burt, Cyril, 3
- Burt, H. E., 74
- Changes of employer, 24, 25, 27, 83f., 97f., 198ff., 207f.; reliability of measure, 252
- Character Education Inquiry, 72
- Character traits vs. success at work, 72
- Classification: of interest level, 22; of work level, 21
- Clerical ability vs. schooling, 36

- Clerical ability, *activities*: of subjects, 7; of delinquents, 91; of girls not working outside their homes, 92f.; of girls who marry early or late, 93f.; scores, 11; scores vs. college success, 86; tests, 122; reliability of test scores, 245
- Clerical ability, *intelligence*: of subjects, 7; high, vs. college success, 85ff.; minus mechanical ability, prediction of, 70ff.; minus mechanical ability, score in, 13ff.; scores, 11; scores, predictive value of, 46; scores vs. success at clerical work, 60; tests, 122; tests, predictive value of, 49, 52
- Clerical work: definition, 24; earnings at, 100ff.; success at, age 20 vs. age 22, 64ff.; success at, prediction of, 57; success at, vs. mechanical work, 21f., 24; success at, vs. test scores, 60f.
- College: attendance by subjects, 85ff., 117; group, 85ff.; success vs. work success, 67f.
- Comparability of earnings at various dates, 238ff.
- Completeness of follow-up records, 134f.
- Conduct, school, marks, 6; reliability of, 246; vs. college success, 86, 91
- Correction of earnings for fluctuations of values, 27, 238ff.
- Constancy of employment of subjects, 97ff.
- Continuation school, 3
- Correlations: at age 20 vs. age 22, 64ff.; of ability and schooling, 33ff.; of earnings and amount of schooling, 96f.; of grades reached, 41; of intelligence and earnings, 57f.; of items of educational history, 44ff.; of school and college success, 86; of school conduct and earnings, 57f.; of size vs. earnings, level, interest, 111; of test scores and earnings, 41
- Counselors, 2, 49, 51, 73f., 108, 111, 113
- Criminals among subjects, 89f., 117
- Current job, reliability of reports, 190ff.
- Custom vs. ability in selection of employees, 108f.
- Dates of testing program, 5, 6
- Deceased subjects, 91
- Definition of kinds of work, 24
- Delinquents among subjects, 89f.
- Derivation: of probable scholarship mark, 150ff.; of probable school progress score, 170ff.; of vocational history items, 193ff.
- Determination of composite measures, 209ff.
- Diary follow-up records, 174
- Differential: earnings at clerical and mechanical work, 100ff.; prognosis of success at clerical or mechanical work, 68ff.
- Duration of employment, reliability of reports, 183
- Earle, F. M., 78, 80
- Earnings: annual, of subjects, 21, 25, 42, 59, 60, 80; annual, differences in, 71; comparability of, 238ff.; computation of, 198ff., 207ff.; correction for, 27, 28; correlation with schooling, 96f.; difference in, for clerical and mechanical workers, 100ff.; effect of experience on, 97; prediction of, 57ff., 84; probable, of workers of one group having average of ability of other group, 103f.; reliability of measure, 251; reliability of subjects' reports, 185; vs. body size, 108f.; weekly, of subjects, 24
- Education, economic value, 96f.
- Educational: guidance, 2; history, in follow-up of subjects, 16ff., 131ff.; success of subjects, 17, 44; success, prediction of, 48, 113f.; success, prediction of, vs. vocational success prediction, 113; success, reliability of measure, 251

- Employers' testimony vs. that of employees, 23, 179ff.
- Entrepreneurs, early, 92
- Errors in testimony, 23
- Evening: college group, 87f.; high school group, 89
- Experience, length of, vs. salary, 26, 97
- Filer, H. A., 75
- Fisher allowance for variation in correlation values, 48
- Follow-up: of subjects, 16ff., 130ff.; records, 174; techniques, 173ff.; visits, frequency of, 174
- Girls: Age Group, 5, 7, 18, 23, 28, 44, 45, 51, 52, 57, 70f., 84, 85, 86, 87, 89, 97, 103, 104, 105, 111, 130f., 209, 222, 223, 245, 246, 247, 248, 249, 250; Assembly Test, 8, 11, 47, 121, 125, 126; Grade Group, 5, 7, 18, 23, 28, 41, 42, 44, 45, 51, 52, 57, 70f., 84, 86, 87, 89, 92, 97, 103, 104, 105, 111, 130f., 133, 170, 209, 222, 223, 245, 246, 247, 248, 249, 250; not working outside their homes, ability of, 92f.; who marry early or late, ability of, 93f.
- Grade reached: at given age vs. educational success, 113f.; at leaving school, 16, 44; at leaving school, reliability of measure, 247; reliability of measure, 244f.
- Groups tested, 5
- Guidance, 1, 6, 30, 32, 36, 41, 49, 72ff., 78, 81, 108, 111, 113ff.
- Half-years in school, 16; reliability of measure, 247
- Hartshorne, Hugh, 72
- High levels of work, prediction of success at, 67f.
- Home group, 28
- I. E. R.: assembly test for girls, 8; clerical capacity test, 142ff.
- Improved prediction at age 22 vs. age 20, 64ff.
- Index of real payroll, 238f.
- Industrial psychology investigators, 73f.
- Inferiority of delinquent groups, 89ff.
- Inferring earnings, level, interest, 202ff., 207f.
- Influence on results of unreliability of reports of subjects, 193f.
- Intelligence: of girls not working outside their homes, 92f.; of girls who marry early or late, 93f.; of subjects, 10f.; score, predictive value of, 49ff.; score vs. college success, 85ff.; score vs. delinquency, 91; score vs. educational and vocational success, 113ff.; score vs. success at clerical and mechanical work, 68ff., 111, 118; score vs. success at work, 59
- Interest in work: classification, 22; computation of measure, 198ff., 207f.; prediction of, 57ff., 84; reliability of measure, 252; score, 24, 25
- Interviews: with employers, 179ff., 190ff.; with subjects, 21, 179ff., 190ff.
- Items: of educational record, 16f.; of information on subjects, 6; of vocational history, 25; secured by interviews, 21
- Kelly, T. L., 81
- Level of work: classification, 21f.; computation of measure, 198ff., 207f.; prediction of, 57ff., 84; reliability of measure, 251, 252; reliability of subjects' reports, 185ff.; score, 24, 25
- London study of careers, 77ff., 116
- Lorge, Irving, 21, 22, 27
- Lost cases, 134f.
- Maller, J. B., 72
- Marriage among subjects, 23, 26, 27, 93f., 117

- May, M. A., 72
- Mechanical abilities score, reliability of, 245
- Mechanical adroitness: of college group, 86; of delinquents, 91; of girls not working outside their homes, 92f.; of girls who marry early or late, 93f.; scores, 11; scores, predictive value of, 46f., 49; scores vs. success at work, 59
- Mechanical work: definition, 24; earnings at, 100ff.; success at, age 20 vs. age 22, 64ff.; success at, prediction of, 57ff.; success at, vs. clerical work, 21f., 24; success at, vs. test scores, 59
- Method of inferring earnings, interest in work, level of work, 202ff.
- Metcalf, Zaida F., 22
- Mixed work: definition, 24; success at, age 20 vs. age 22, 64ff.; success at, vs. test scores, 60
- Monthly Labor Bulletin, 238
- Multiple correlations: among test data, 50; for prognosis, 209ff., 218ff.
- Myers, C. S., 3, 74, 78
- National Institute of Industrial Psychology, 78ff.
- Number of promotions, 6, 19; score for, 170ff.
- Number of subjects, 5, 130ff., 134
- O'Rourke, L. J., 75f., 115
- Otis Arithmetical Reasoning Test, 137
- Parental status vs. vocational success, 106f., 118
- Partial correlation of size and earnings, 111
- Prediction of success: at clerical work, 115; at clerical work vs. mechanical work, 69ff.; at high levels, 67f.; at mechanical work, 115
- Prediction of educational success, 48, 113
- Predictive value: of age-grade status, 49; of educational items, 30f., 44ff.; of intelligence, 49, 57; of mechanical adroitness, 49; of scholarship marks, 49; of school attendance, 49; of school conduct, 49, 57; of school progress, 49; of vocational items, 31
- Probable earnings at one kind of work by workers of equal ability at other kinds of work, 103
- Professional work group, 24
- Prognosis value of items, 209ff., 220ff. (*see also* Predictive value)
- Progress in school after tests, 16f., 19, 170ff.; reliability of measure, 248
- Progress in school at time of tests, 6, 16
- Promotions, number of, 6, 16, 44, 46ff., 218
- Reading scores, 7, 11; predictive value of, 46; reliability of, 246
- Reading test, 124f.
- Relations, subjects employed by, 91f.
- Reliability: of age at leaving school, 247; of age at tests, 245; of arithmetic score, 245; of attendance mark, 247; of changes of employer measure, 252; of clerical activities score, 245; of clerical intelligence score, 245; of earnings measure, 251; of educational success measure, 251; of grade reached at age 14, 244ff.; of grade reached after tests, 247; of half-years in school, 247; of intelligence score, 246; of interest in work measure, 251f.; of level of work measure, 251f.; of measures used, 244ff.; of mechanical adroitness score, 245; of percentage of time employed measure, 252; of progress in school score, 246; of reading score, 246; of reports by subjects, 179ff.; of reports on current job, 190ff.; of reports on duration of employment, 183f.; of reports on earnings, interest, level of work,

- 1851.; of scholarship mark, 246; of scholarship mark after tests, 249; of school conduct mark, 246; of school progress after tests, 248
- Robinson, Eleanor E., 22
- Rules for computing derived items, 13, 14, 198ff.
- Salary, annual, of subjects, 24, 25, 60, 191, 194, 201, 202, 207, 239, 241 (*see also* Earnings)
- Sample studied for reliability of reports, 180ff.
- Scale: for interest classification, 22; for level of work classification, 21f.
- Scholarship: after the tests, reliability of marks for, 249; high, vs. college success, 85ff.; marks, predictive value of, 49ff.; marks, reliability of, 246; of delinquents, 91; of girls not working outside their homes, 92f.; of girls who marry early or late, 93f.; of subjects after tests, 17, 19, 44; of subjects employed by relatives, 91f.; of subjects self-employed, 92
- School advancement: of college groups, 86; of delinquents, 91; of girls not working outside their homes, 92f.; of girls who marry early or late, 93f.; score, 150ff.
- School attendance: of delinquents, 90; of early deceased, 91; of seriously ill, 91; of subjects, 6, 7, 49, 218; predictive value of, 46, 49ff., 60, 61, 218; reliability of, 247
- School conduct: of subjects, 6, 7; predictive value of, 49ff., 61; vs. college success, 86; vs. success at work, 59
- School progress after tests: of subjects, 16, 19, 44; predictive value of, 49; reliability of, 248; score, 170ff.
- Schooling vs. work, economic value, 97
- Selection: of lost subjects, 135; of subjects, 5, 130
- Self-employment of subjects, 92
- Shuttleworth, F. K., 72
- Size: vs. earnings, 108; vs. interest in work, 108, 118; vs. level of work, 108
- Smith, Percival, 78, 82
- Social Service Exchange, 176f.
- Special groups, 85ff.
- Stanford Achievement Tests, 137
- Status of parents vs. success at work, 106f.
- Stenquist Assembly Test, 3, 7, 11, 13, 47, 121, 127ff.
- Stenquist, J. L., 121, 245
- Stoelting, C. H., Co., 122
- Strong, E. K., 72
- Student group, 28, 85ff.
- Success: at clerical work vs. clerical intelligence, 60, 114f.; at mechanical work, 59; at mixed work, 60f.; after age 22, prediction of, 64f.; at high levels, 67; at work, 64; at work vs. at school, 59ff.; symptoms of, 78ff., 84
- Teachers' marks, 220; predictive value of, 45, 49, 51, 52, 60, 64, 87, 89, 91, 92, 93ff., 150ff., 161ff., 218, 220, 221
- Tests administered, 1
- Thorndike-McCall Reading Scale, 123, 124f., 137, 246
- Toops, Herbert A., 1, 10, 75, 121, 122
- Transmutation: of scholarship marks, 150f.; of scores, 137ff.; of scores in arithmetic, 137ff.; of scores in clerical activities, 142; of scores in clerical intelligence, 140f.; of scores in I. E. R. Girls Assembly Test, 145f.; of scores in reading, 138; of scores in Stenquist Assembly Test, 145
- Uncooperative subjects, 135f.
- Unemployment, 24, 28, 101
- Unreliability: of age at leaving school, 247; of age at test, 245; of arithmetic score, 245; of attendance mark, 247; of clerical activities score, 245; of

- clerical intelligence score, 245; of grade reached after test, 247; of grade reached at test, 244f.; of half-years in school, 247; of measures secured, 244ff.; of mechanical adroitness score, 245; of scholarship after tests, 249; of scholarship marks, 246; of school conduct mark, 246; of school progress after tests, 248; of school progress score, 246
- Unreliability of reports: by subjects, 179ff.; on current job, 190ff.; on duration of employment, 183f.; on earnings, 185; on level of work, 185f.; influence of, on results, 193f
- Value, economic, of education, 96f.
- Variance in employers' and employees' reports, 180ff.
- Visits, follow-up, to subjects, 21
- Viteles, M. S., 73
- Vocational: counselor, 2, 49, 51, 73f., 108, 111, 113, 244; follow-up of subjects, 21ff., 130ff.; guidance, 2, 4; history of subjects, 21, 25; success vs. parental status, 106f. (*see also* Clerical; Mechanical)
- Vocational Guidance Follow-up Index of Real Payroll, 238, 239
- Weighted scores: for interest in work, 24; for level of work, 24
- Welfare Council, 195
- White-collar workers, 117f. (*see also* Clerical)
- Woolley, Helen T., 76f., 116
- Work: groups, 23; histories from employees, 21ff., 118ff.; histories from employers, 179ff.; interest classification, 22; level classification, 21f.; records, 174ff.; vs. schooling, economic value of, 97

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